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VOL. 23 JANUARY, 1937 No. 1

Orthodontia

DIAGNOSIS AND TREATMENT OF DENTAL AND MANDIBULAR RETROVERSIONS

JAMES DAVID MCCOY, M.S., D.D.S., F.A.C.D., LOS ANGELES, CALIF.

IN THE evolution of orthodontic thought, many of our early concepts have been abandoned. Among these was the belief that the correction of "malocclusing teeth," per se, constituted the orthodontic problem and that with this accomplished, treatment responsibilities were fully satisfied. When faced with the fact that an increasing number of cases failed to terminate satisfactorily under this plan, our more observant clinicians broadened their viewpoint to include a more complete application of biologic principles in the evaluation of cases. This was essential, for it had become apparent that the problem was by no means as simple as originally supposed; and the teeth, in spite of their significant bearing, were accorded the position of being but one factor, with several others of primary importance. In natural sequence came the realization that dental and oral anomalies represent conditions in which aberrations of growth and function are manifest, with their character depending largely upon the age period, degree of severity, and the length of time such pathologic influences have been in effect. In this manner the scope of the problem increased materially and offered a challenge which could not be ignored if our specialty was to meet its full obligations.

The varied nature of our objective, and especially the necessity of considering the growth factor, has proved that we cannot think of appliances alone as being the open sesame for the relief of such conditions. The responsibility attending their use, however, has not been lessened; for in supplying an indispensable means for bringing about tooth movements and other needed

Presented at the Thirty-Fourth Annual Meeting of the American Society of Orthodontists, St. Louis, April 20-23, 1936.

anatomical alterations, the mandate for their operation, in a manner to augment inherent helpful possibilities within the structures themselves, is given added importance. The general problem extends itself in so many different

Fig. 1.—A study in oral and dental anomalies illustrating a variety of combinations. In a few, the abnormality is limited to the denture alone, but in the majority of instances includes the jaws and some of the external features of the face. (Figs. 1 and 3 have been taken from the fourth edition of the author's book, *Applied Orthodontics*, and are used through the courtesy of the publishers, Lea & Febiger, Philadelphia.)

directions, and calls for the consideration of such variable factors, that the responsible clinician stands aghast at the casual manner with which it is

still viewed in some quarters. Until this situation is altered, and the dental profession and the layman alike assume toward orthodontic treatment the same degree of seriousness as that given other orthopedic operations, we shall not see our successes appreciably augmented in number or their benefits justly evaluated. In confirmation of this statement, and as a brief but far from complete premise of our responsibilities, attention is called to Fig. 1, in which a study of fifteen commonly occurring cases is shown. In some few, the abnormality is limited to the denture alone, but in the majority of instances it includes the jaws and some of the external features of the face.

Among the anomalies which have placed orthodontists under the greatest responsibility are those characterized by malrelationships between the

Fig. 2.—A group of eight cases having very similar dentures. In the upper row, the anomalies are limited to the denture alone; while, in the lower row, the mandibular structures are seriously involved.

maxillary and the mandibular structures. Under this broad classification are to be found those cases in which, inclusive with other anomalies, the mandibular teeth are posterior to the normal relationship. Such anomalies may be limited to the denture alone; that is, the teeth and their immediate alveolar supports only may be involved, or additional mandibular structures may be included in the deformity. In the event of this additional involvement, the body or the rami, or both, may contribute in differing degrees. This fact becomes the more evident as we examine Fig. 2, in which a group of such cases is shown. In such instances marked similarities in the dentures and in the relationship of the teeth prevails, but in spite of this fact other condi-

tions outside the immediate dental area are so definitely evident that the dissimilarity of the two types immediately becomes established.

In times past, all cases having either of these characteristics were known as "Class II cases," "distoclusions," "posterior occlusions," etc.; and until orthodontists supplemented their powers of observation with dependable denture and facial records for diagnostic purposes and to record treatment accomplishments, their wide variability was not fully recognized. In view of the fact that other important elements besides tooth closure must be considered in describing anomalies, I feel that the terms "retro" (meaning in a backward direction) and "version" (implying position) more adequately describe the most outstanding characteristics of these cases. Hence, we may have a "dental retroversion" in which the teeth contribute chiefly to the condition, or a ("dental" plus) "mandibular retroversion," when in addition, the mandibular structures are likewise involved. In describing other dental anomalies, the term "antiversion" is also suggested to designate structures which have deviated in a forward direction; "intraversion" to describe narrow dental arches or individual teeth too near the median plane; "extraversion" to designate deviations in the opposite direction; and the terms "supra" and "infra" version to signify structures above or below their normal positions. Such terms are suggested because of their simplicity and application to all structures included in the anomalies we must consider.

In meeting the responsibilities connected with dental and mandibular retroversions, the necessity for accurate diagnostic measures becomes evident. The variability of the problem, not only between the two distinct types, but in properly evaluating differences in each type, makes such measures imperative if effective treatment is to be carried out. In such appraisals, we all realize that personal judgment must, to some extent, be used to interpret what we see in our cases. It is, therefore, important that we approach each problem provided with every helpful means which will aid our powers of observation. To this end, any objective plan of recording anomalies should provide not only the means of showing the position of the denture in the face, the angle of the occlusal plane, symmetrical or asymmetrical growth manifestations, the angle of inclination of the teeth, but also any other information which will render such judgment less fallible. The aid such denture and facial record may give is shown, at least in part, in Fig. 3. The wide diversity of conditions which such records show, soon impels the conclusion that the only logical method of classifying anomalies consists in naming them as they occur in each case, and that treatment policies must be based upon these revelations.

With such records before him, the practitioner may note (1) the occlusion of the teeth and the form and relationship of the opposing dental arches; (2) whether or not the anomaly extends beyond the immediate area of the teeth and includes the alveolar portion of the jaws; (3) or beyond these boundaries, and involves the maxilla or the mandible, or both; (4) in the case of the mandible, whether the body or the rami are involved and, if so, to what extent each contributes; (5) from roentgenograms, such relevant facts

as they reveal; and (6) through intraoral and extraoral study of the musculature of the face and the tongue, any abnormalities of these structures may be noted. In other words, every part of the oral ensemble affected by or contributing to the anomaly should be differentiated. In establishing a

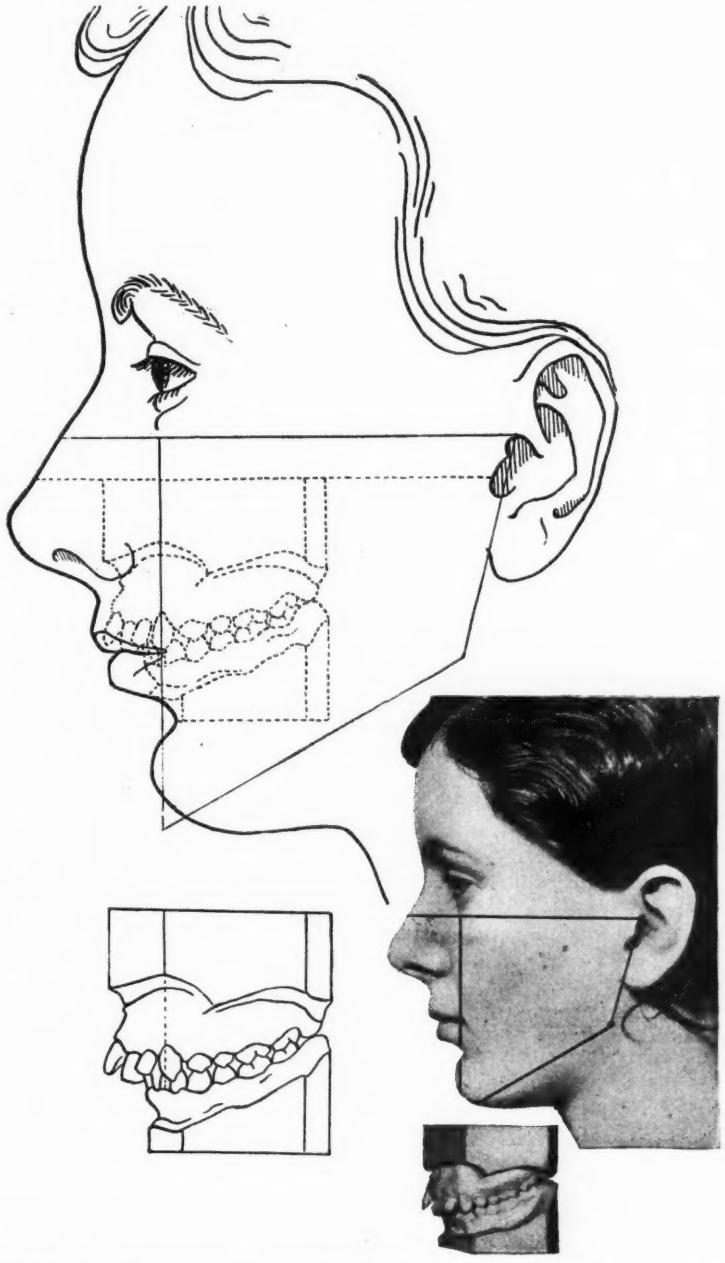


Fig. 3.—The lateral aspect of an anomaly, illustrating in part the value of related denture and facial reproductions.

basis for comparison between conditions as recorded and those which may reasonably be considered "the normal," "the mean" "or average" usually encountered under normal conditions may be used as a criterion. Following this, a finer differentiation should be made when determining the needs of

treatment by considering each case upon the basis of its individual typal requirements. When this point has been reached, the practitioner is in a position to direct his efforts intelligently and skillfully in the field of treatment.

In the selection of orthodontic mechanism to meet the demands of treatment, there are available several proved types which fulfill our needs. In meeting the special requirements of dental and mandibular retroversions, the labial arch wire, with special control features, will suffice for the maxillary teeth; and the removable lingual arch wire, with auxiliaries, will prove adequate for the mandibular teeth. While simplicity of application is a virtue to be adhered to, this principle should not be carried to the point of omitting any features essential in efficiently and promptly bringing about tooth movements, dental arch alterations, the establishment of dento-intermaxillary relations of advantage, and otherwise establishing the denture within the normal functional range.

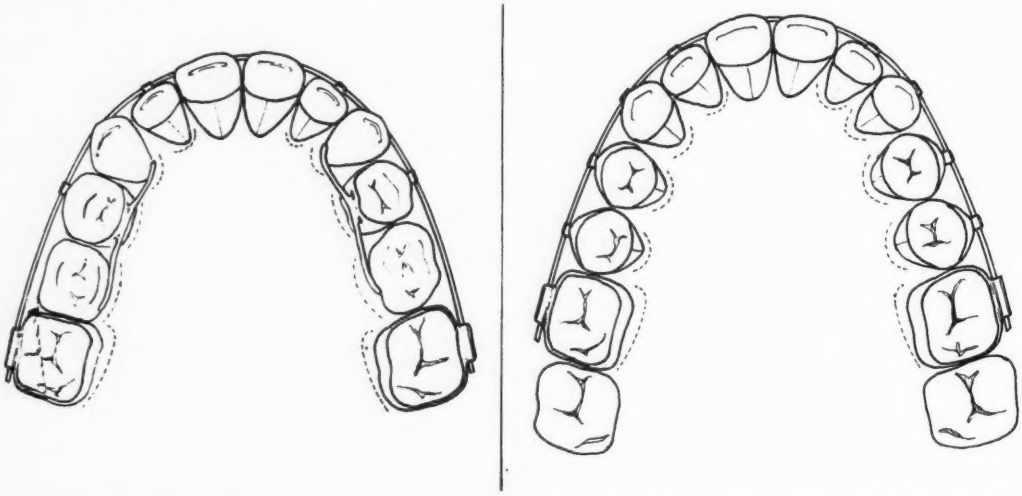


Fig. 4.—A labial arch wire, with provisions to control the frontal and lateral segments of the maxillary dental arch.

In employing the labial arch wire, the flexible type is deemed preferable for it can be adapted to the teeth regardless of their degree of disarrangement, and, through its gradual modification, changes of advantage quickly gained. Where our diagnostic findings show marked intraversions of the lateral segments of the dental arch, with anteversion of the maxillary incisors, the correction of these anomalies must progress adequately before active measures to place the mandibular teeth in correct anteroposterior relationships are attempted. If, in addition, the necessity of changing the vertical relationship of the incisors in an upward direction is evident, this also must progress to the point where major interference with the forward movement of the mandibular teeth will be eliminated.

The diversity of anomalous involvements in different cases makes it necessary to vary the control features, but it is felt that the banding of the four incisors is usually necessary. The control of the lateral segments of the dental arch, with the deciduous teeth still in place, may be effectively

achieved by providing bands for the first deciduous molars with lingual spurs extending to adjacent teeth on each side. Through this means the dental arch may be brought to the desired width proportions, and the horizontal and vertical positions of the incisors controlled, the primary anchorage units being the first permanent molars. Such an arrangement of appliances is illustrated in Fig. 4. A round labial arch wire, of precious metal alloy 0.030 inch in diameter is advocated, this being secured to the anchor teeth by round buccal tubings, with the medium of attachment between other banded teeth provided by open tube attachments. With such provisions, it may be removed, given necessary modifications, replaced and locked into position with ease. The annoyance and time spent in cutting and replacing "tie wires" are thereby avoided. In older cases, in which the bicuspids and cuspids have erupted, it may be necessary to provide for their direct control, but in many instances such extensive banding is not necessary, the plan suggested for their deciduous predecessors proving adequate. In the hands of the skilled clinician, the round arch wire can be used for all tooth movements, be they rotations, tipping or bodily movements, group movements, or other essential changes, the features providing for such varied control being available in the band attachments and additions to the arch wire, as shown in Fig. 5.

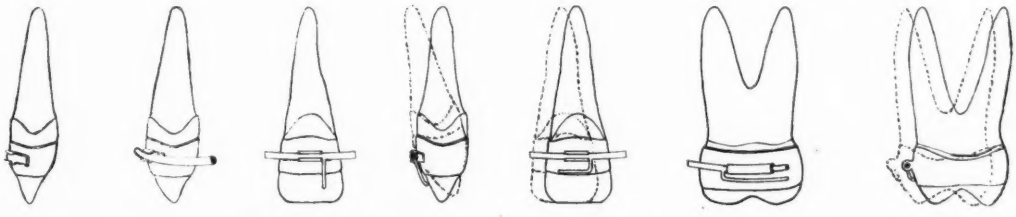


Fig. 5.—Means of controlling individual tooth movements, and meeting anchorage requirements with a round labial arch wire.

In giving emphasis to the advantage of keeping the mechanism as simple as possible, the caution is also expressed of overdoing this commendable principle to such an extent that treatment progress will be retarded or final results fail to reach the most desirable status. We have all seen instances in which such omissions have proved detrimental from more than one standpoint. In laying the foundation for treatment, therefore, we should endeavor to anticipate all tooth movements and provide every means necessary to accomplish our objective promptly. In such planning, the conviction is felt that rigid attachments which completely restrict individual dentoalveolar movements should be avoided, and in their stead nonrigid, but controlled, attachments should be employed. These, in conjunction with the round arch wire which lends itself to accuracy in bending and other changes essential during its adaptation, offer welcome relief to patients in freedom from soreness following adjustments.

Coincident with the efforts already described in connection with the maxillary teeth, changes should be started in the mandibular dental arch which will eventually perfect its form and render it quickly adaptable when the process of establishing correct dentofunctional relations with the maxillary

teeth is inaugurated. In meeting these requirements the removable lingual arch wire offers particular advantages. Through the employment of auxiliary springs, individual and group tooth movements essential to prepare the dental arch for functional adaptation with the maxillary teeth are effected, and at the same time adequate anchorage requirements are provided for mass changes which occur with the application of intermaxillary pressure.

To render the lingual arch wire more stable and to reduce any likelihood of its being displaced by the tongue, bands should be provided for both canine teeth carrying spurs which slightly overlap the arch wire. In addition to their stabilizing effect, these provide some additional anchorage and make it unnecessary for the attachments upon the molar teeth to possess a high degree of rigidness. While such attachments should by no means be loose jointed, a very slight mobility within the range of control reduces difficulty in removing and replacing the arch wire, places less restraint upon the anchor teeth, and thereby provides greater comfort for the patient. Such an appliance is shown in Fig. 6.

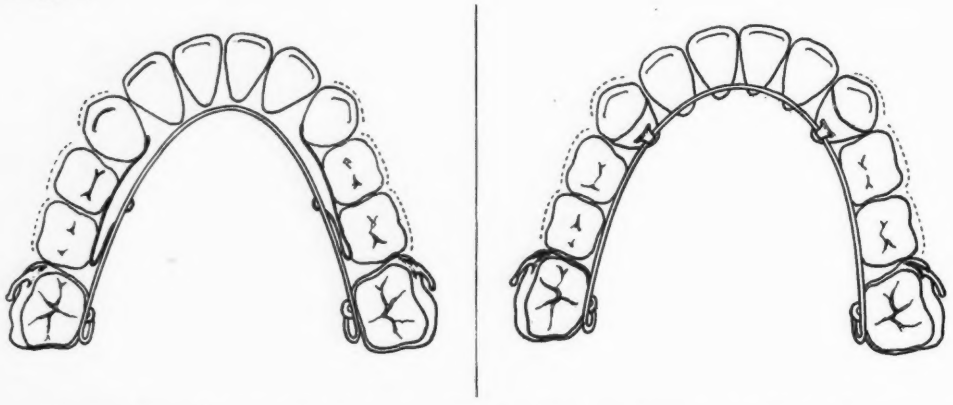


Fig. 6.—Lingual arch wire in place with auxiliary springs, and with tooth movement carried to the point where anchorage requirements for the forward movement of the mandibular teeth are provided.

When the mandibular dental arch has progressed toward normal form and similar changes have been effected in the maxillary arch, intermaxillary pressure should be inaugurated. To insure adequate anchorage facilities, the lingual arch wire should be in contact with the six anterior teeth in close proximity to their gingival margins. Such an arrangement will, in the majority of instances, prove adequate; but, where additional stability is desired, a labial segment of small gauge wire may be added, being extended through the embrasure between the cuspid and the first bicuspid on each side, and brought in contact with all the anterior teeth at a slightly higher level than the lingual arch wire. This will overcome any tendency for the mandibular incisors to tip forward as they move in an anterior direction. This mechanism may be latched into a stable relationship by providing a miniature notch upon the outer surface of each canine band. Such an appliance is shown in Fig. 7.

In applying intermaxillary elastics, hooks are provided upon the mandibular molar bands and upon the maxillary labial arch wire. These latter should be soldered in the canine region and extend downward, a distance just

short of the cutting edge of the tooth. This makes it possible for the pull of the rubber bands approximately to parallel the cusps of the occluding teeth when the jaws are closed, and provides, thereby, a forward pull, and one which is less up and down in its direction. This is important, for pressure exerted at sharp angles will have a tendency to extrude the maxillary incisors and also disturb the mandibular molar anchor teeth. Fig. 8 illustrates the principles involved.

In the treatment of both dental and mandibular retroversions, the operation of the appliances is similar in many instances, although treatment requirements differ radically. Taken as a general class, dental retroversions respond more readily, for such anomalies are limited to the denture alone. In mandibular retroversions, our efforts must be continued much longer, and

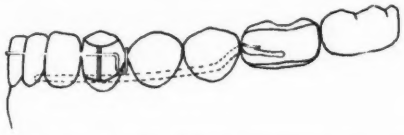


Fig. 7.—Lingual arch wire with auxiliary labial segment to provide additional anchorage stability.

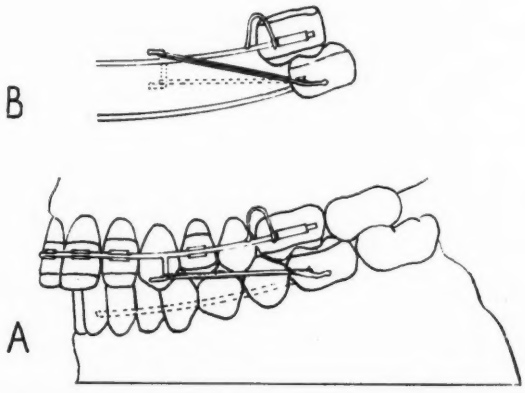


Fig. 8.—Principles of (*A*) advantage and (*B*) disadvantage in the application of intermaxillary pressure.

frequently additional therapy must be employed before treatment can approach the status of finality. Growth tendencies must be encouraged, for supplemental growth in the mandibular structures is needed to establish and maintain functional and anatomic balance. In addition to the appliances, therefore, every means which will favor this principle should be employed. While we are limited in available agencies, we can gain much help through the restraining of muscles which have previously been in malfunction and by building up those lacking in tone, and thereby favor growth equilibrium.

Inasmuch as the orthodontist must have suitable material to work upon if his measures are to have the degree of success which is desired, it is entirely conceivable that the practitioner of pediatrics may prove an indispensable ally in many of these cases. We know that the process of growth depends upon many conditions, among which the necessary food factors in

the way of proteins, fats, carbohydrates, the necessary minerals, and vitamins to fulfill natural requirements play an important rôle. Tissues must be maintained in a state of health if the tempo of growth changes induced by orthodontic treatment are to proceed unretarded. In addition, our medical confreres may be necessary in the elimination of pathologic involvements of the nose and throat, for the relief of allergic conditions affecting normal respiration, for overcoming endocrine dysfunction, for the correction of faulty body posture, and other factors essential in establishing and maintaining optimum metabolic balance.

Our first step in treating either type consists in establishing dental function through bringing about the changes necessary to place the teeth, dental arches, and jaws within the functional range, and then in the more involved cases, supplement dental function with muscular function. The timeworn physiologic axiom that "function and growth go hand in hand," here demonstrates its infallibility, but when applied must include all those parts which make up the assemblage of structures we call the oral ensemble.

The wearing of intermaxillary elastics in itself is a definite help in the matter of muscle training. We have all seen many instances in which the muscles have sought relief from the constant pull of the rubber bands by moving the mandible forward and thereby reducing the tension. Even the limited use of the muscles in this changed relationship, when continued through the periods necessary, favors their adaptation to the altered positions of the dental arches. Doubtless many clinicians who underestimate the value of this type of therapy have, through this method, unconsciously received its benefits.

In the treatment of these anomalies, an important consideration is the manner in which the maxillary first permanent molars are handled. These almost always need rotation, with their mesiobuccal angles being moved outward in the direction of the cheek. By taking this precaution, their favorable cuspal relations with the mandibular molars are immediately favored, their space requirements in the dental arch are reduced, and the bicuspids or other teeth adjacent to them are aided in alignment and cuspal adaptation. This is a point all too frequently overlooked in the guidance of these important functional units.

In presenting a series of cases for your critical study, it will be my object to show, in the form of denture and facial reproductions, much of the important clinical evidence upon which diagnosis was based, and by the same means, the sequelae of treatment efforts necessary to fulfill the purpose of this paper. The written and roentgenographic records will not be included in the illustrations, although facts relating to them will doubtless be mentioned from time to time. The cases selected are typical of those which any orthodontist meets from day to day, and most of them have been recorded over a sufficient period of years to justify the conclusions reached. To this end, all illustrations have been prepared in a similar manner, showing the facial reproductions and the accompanying denture reproductions in such a relationship that their inter-

dependent status is easily made apparent. These have all been photographed in exactly one-half life size, thereby rendering dependent relationships less confusing than where differing proportionate sizes are used between the two. In keeping with anthropologic custom, the left profile is taken with the median plane of the head parallel to the plate or film. The advantage of this stand-

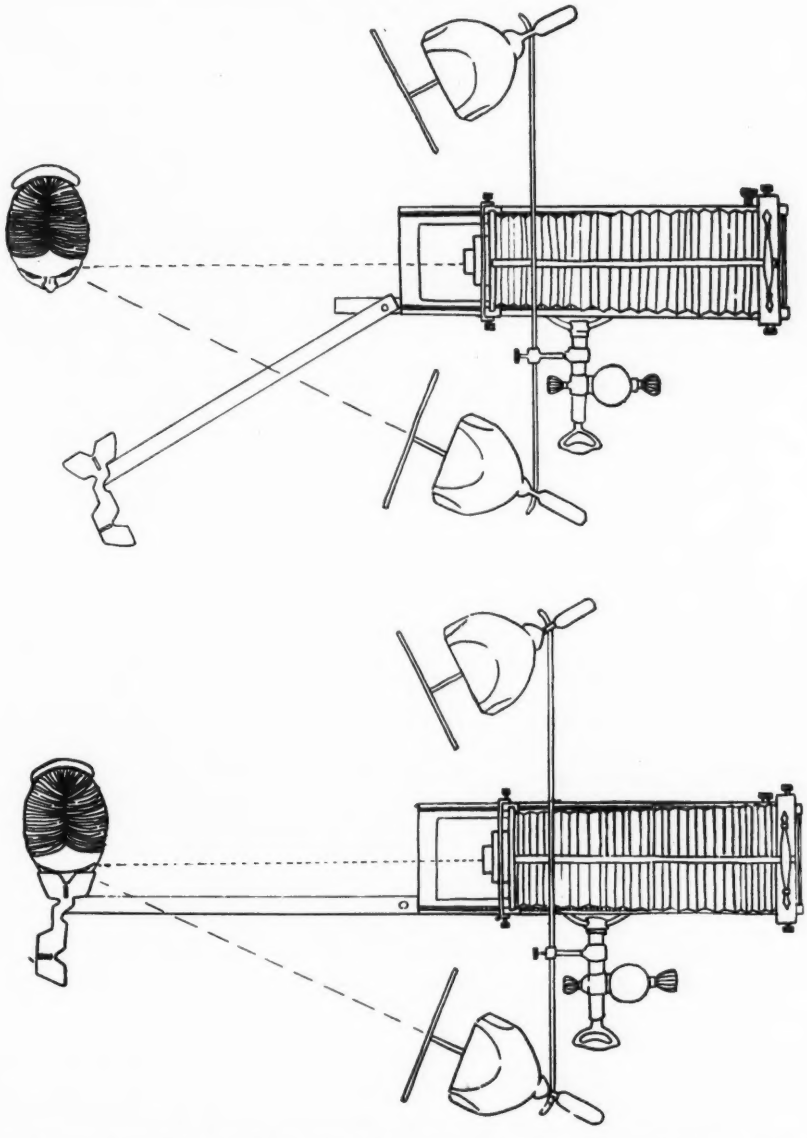


Fig. 9.—A simple and efficient plan for making profile facial reproductions. Patient posed (below) and the exposure being made (above).

ardized plan becomes obvious when successive pictures of patients are made, and growth changes resulting from treatment are to be recorded. A simple but efficient technic for making such facial reproductions is shown in Fig. 9.

In order that such reproductions may prove more comprehensive for purpose of analysis, two planes of the face, as well as a lineal representation of the mandible, have been indicated upon them. The advantage of this becomes

obvious when they are compared with the ordinary unrelated facial photographs, and in addition it completes the facial record in harmony with similar identifications upon the denture reproductions, thereby effectively showing the orientation of the denture to its dependent facial structures. These records enable us to observe and study the points, lines, angles, and confirmation of the features, and especially the lower half of the face, often referred to as the "changeable area," and discern therein aberrations of growth having a direct bearing upon our problem.

In considering the anomalies present, we shall approach each in a similar manner, subjecting essential parts to analysis. This will include the four basic considerations to diagnosis and treatment; namely, (A) dental arch width; (B) the anteroposterior relationship of the opposing teeth; (C) the vertical relations of the denture in the face; (D) the status of the facial muscles. Such a plan is helpful in establishing routine habits which, in the end, broadens our concept and augments our diagnostic acumen. The denture will first be considered, and then the face; although the interdependence of the two factors merge in so many instances that to separate them is difficult, except where the denture only is affected. Even with such, this information is essential to our diagnostic decisions. It will be noted that in all cases presented the orbital plane intersects the denture in the region of the canine teeth. This, in conjunction with other anatomic facts revealed in the facial reproductions, lends emphasis to the conclusion that in the alteration of anteroposterior relations the mandibular teeth, or these, plus their supporting mandibular structures, are the more seriously affected in their facial relationships.

In describing treatment procedures, two distinct periods, or phases, will be differentiated; i.e., "primary" and "secondary" treatment. The first of these is concerned with the restoring of the teeth, dental arches and jaws to normal form and function; the second, to the utilization of all influences and agents necessary to maintain the new relationships until they become permanently adapted, through function and growth, to other adjacent dependent structures. The first of these accomplishments may frequently be realized in relatively short periods, but the growth changes which must follow are of equal importance to the final success of our work. With the realization that treatment during the active growing period has decided advantages, the average patient comes to us with a mixed dentition. This means that, either during primary treatment or more frequently following it, certain groups of teeth must be shed and replaced by their permanent successors before the completion of the masticatory apparatus is realized. In addition to conditions within the immediate denture, frequently marked changes in the body or rami of the mandible, in the maxilla, and in the growth and functional activity of the muscles, must ensue before the adaptive process can be carried to the point approaching finality. These events do not always occur as anticipated, and we are confronted with delays which run into many months and, in some instances, into years. During this period the most studious observation must be carried out if final results of a high order are to be achieved.

In all cases reported, the appliances represented by Figs. 5 to 8 inclusive were used. The changes brought about by individual or group tooth movements will be evident in the study of the denture and facial reproductions in the illustrations which follow. In view of the standardized technic used, these afford a study of more than ordinary interest, in revealing both the nature of the anomalies and what actually occurred as the result of treatment efforts.

CASE 1.—(Fig. 10.) A girl ten years of age.

(A) Bimaxillary alveolar intraversion, mild in degree.
(B) Upper incisal anteversion. Lower bilateral dental retroversion. Mandibular structures normal.

Fig. 10.—Case 1, a girl ten years of age.

(C) Supraversion of the upper incisors, mild in degree.
(D) Facial muscles normal in tone, lips in function.

Primary treatment was started October 9, 1931, and the teeth were established in function May 25, 1932 (approximately seven months). Fixed appliances were then removed from the upper teeth, and a Hawley appliance was installed and worn by the patient at night only. This was provided with an inclined shelf so that when the jaws were closed the molars and other teeth in the lateral segments of the dental arches were deprived of occlusal contact. This method was employed to favor vertical growth changes in these regions. Upon the lower teeth the removable lingual arch wire was left in place until the eruption of the bicuspids, at which time it was removed. Successive facial denture reproductions show growth and functional changes of advantage. Patient dismissed after two years of secondary treatment.

CASE 2.—(Fig. 11.) A girl thirteen years of age.

(A) Bimaxillary alveolar intraversion, right side affected more than left.
(B) Upper incisal anteversion. Lower bilateral dental retroversion. Mandibular structures normal.
(C) Upper incisal supraversion.
(D) Facial muscles lacking in tone, lips malrelated.

Primary treatment started July 10, 1928; secondary treatment was inaugurated Nov. 7, 1929 (approximately sixteen months), at which time all fixed appliances were removed from the upper teeth and a Hawley appliance, with lingual shelf to control the overbite, was installed and worn at night only. The removable lingual arch wire was removed from the lower teeth and a cuspid-to-cuspid retainer substituted. Exercises for general facial development were prescribed and faithfully carried out. The series of facial and denture reproductions show growth changes of advantage in the denture and in the orbicularis oris muscle, and other structures related to it. After three years of secondary treatment the

Fig. 11.—Case 2, a girl thirteen years of age.

patient was dismissed, but the cuspid-to-cuspid retainer was left in place pending the eruption of the third molars. Recorded as a matter of interest again Jan. 27, 1934.

CASE 3.—(Fig. 12.) A girl eight years of age.

(A) Bimaxillary alveolar intraversion, mild.
(B) Upper incisal anteversion. Lower bilateral dental retroversion. Mandibular structures normal.
(C) Upper incisal supraversion.
(D) Facial muscles normal in tone, with lips in function.

Primary treatment started Nov. 7, 1928. Secondary treatment commenced approximately a year later, but fixed appliances left in place until July 27, 1931. Upon the eruption of the bicuspids and canines which had occurred by this time, a Hawley appliance, carrying a lingual shelf which allowed the posterior teeth to be separated when the jaws were closed, was installed and worn at night only. No appliances were left upon the lower teeth. Muscular exercises were prescribed, these being directed to the temporal and masseter groups. This type of therapy was continued approximately a year, and the patient dismissed except for periodic

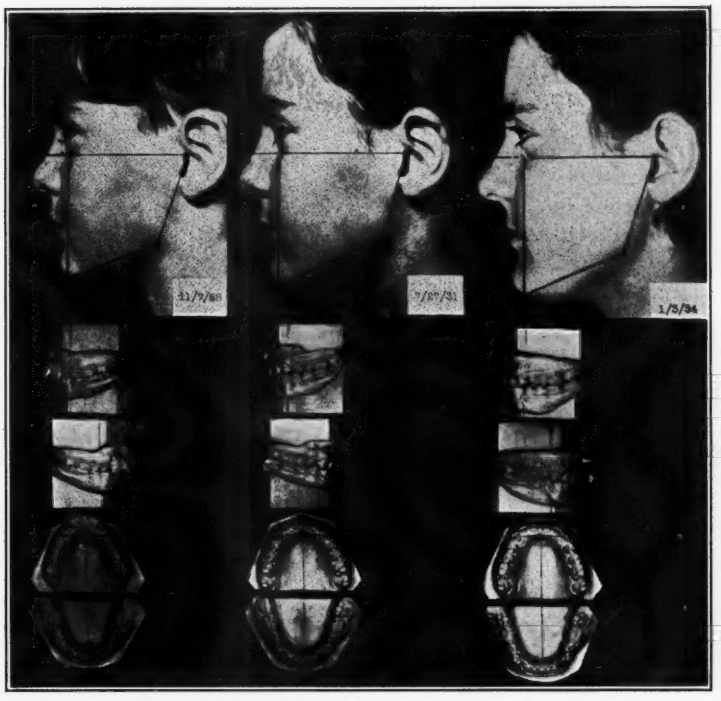


Fig. 12.—Case 3, a girl eight years of age.

Fig. 13.—Case 4, a girl twelve years of age.

roentgenographic examination of the third molars. These were progressing normally. The case was again recorded as a matter of interest on Jan. 3, 1934. Advantageous changes in the functional relations of the teeth are evident, with an improvement in the incisogingival relations.

CASE 4.—(Fig. 13.) A girl twelve years of age.

(A) Upper alveolar intraversion asymmetrical, left side affected more than right. Lower normal.

(B) Upper central incisors in retroversion, with lateral incisors in anteversion. Lower bilateral dental retroversion. Mandibular structures normal.

(C) Upper incisal supraversion, extreme.

(D) Facial muscles normal in tone, lips in function.

Primary treatment started March 27, 1931, and the teeth established in function by Jan. 5, 1932 (approximately nine months). Secondary treatment was inaugurated soon

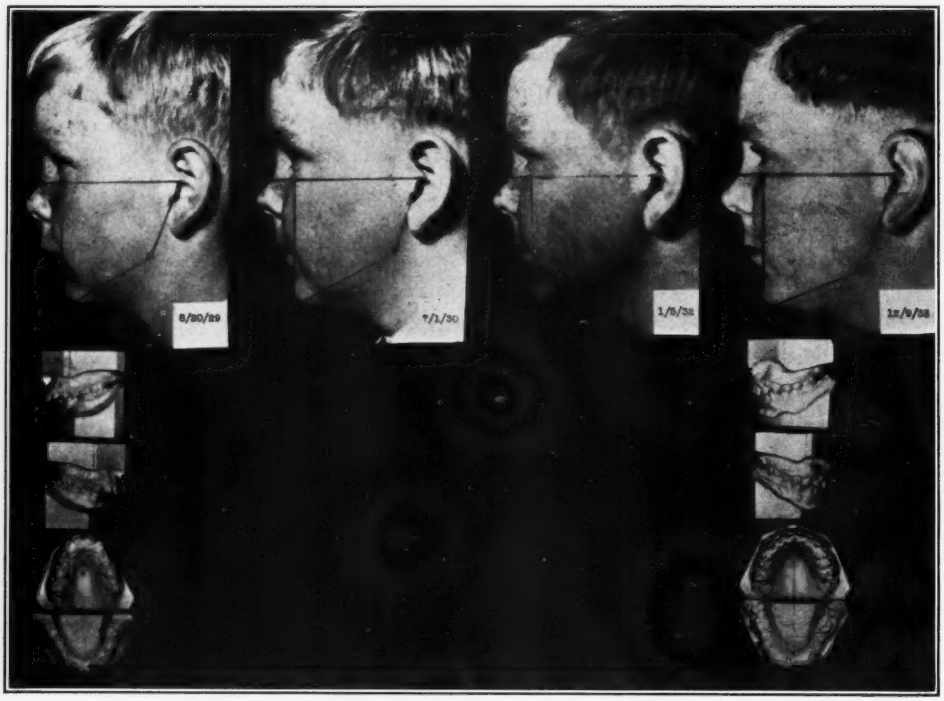


Fig. 14.—Case 5, a boy nine years of age.

after this date, with all fixed appliances being removed from the upper teeth and a Hawley appliance substituted in their place. This was worn at night only and supplied a means of keeping the bicuspids and molars separated so that vertical changes of advantage in this region were encouraged. The successive denture reproductions reveal the extent to which these occurred. After two years of secondary treatment, the patient was dismissed except for periodic roentgenographic examination of the third molars, which were progressing normally, a cuspid-to-cuspid retainer being left in place pending their eruption.

CASE 5.—(Fig. 14.) A boy nine years of age.

(A) Bimaxillary alveolar intraversion, medium in degree, left side affected more than right.

(B) Upper incisal anteversion. Lower bilateral dental, plus mandibular retroversion, body and rami equally affected.

(C) Supraversion of the upper incisors, medium in degree.

(D) Facial muscles deficient in tone, lips malrelated.

Primary treatment started Aug. 20, 1929, and the teeth established in improved function by July 1, 1930. Patient very lax in wearing intermaxillary elastics and otherwise not cooperating. Because of this, fixed appliances were left in place until Dec. 9, 1933, at which time they were removed, a Hawley appliance was fitted to the upper teeth, and a cuspid-to-cuspid retainer put on the lower teeth. Marked growth changes had occurred in the mandibular structures, as the successive facial reproductions reveal. It is felt that these could have been accomplished much more promptly if the patient had assumed his share of the responsibility. The case is still under secondary treatment.

CASE 6.—(Fig. 15.) A girl nine years of age.

(A) Upper alveolar intraversion, symmetrical in character, mild in degree. Lower normal.
(B) Upper incisal anteversion. Lower bilateral dental, plus mandibular, retroversion. Growth deficiencies in rami especially apparent.

Fig. 15.—Case 6, a girl nine years of age.

(C) Supraversion of upper incisors. Bimaxillary posterior infraversion.
(D) Facial muscles deficient in tone, with lips malrelated.

Primary treatment started July 24, 1933, and the teeth established in their normal functional relations by Jan. 3, 1934 (five months). During a protracted period of secondary treatment, which followed, all active treatment appliances were left in place and the wearing of intermaxillary elastics was resorted to at night only, during such periods as such aid was deemed necessary. Exercises to build up the orbicularis oris and other structures related to it were put into effect with gratifying results. The patient assumed her obligations in a most idealistic way, which was largely responsible for the promptness with which favorable growth changes occurred. The case is still under secondary treatment, with the bicuspids and canines erupting in an orderly manner.

CASE 7.—(Fig. 16.) A girl eight years and six months of age.

(A) Bimaxillary alveolar intraversion, mild in degree.
(B) Upper incisal anteversion. Lower bilateral dental, plus mandibular, retroversion. Marked arrestment in the growth of the body of the mandible.

(C) Supraversion of the upper incisors, mild in degree.
(D) Facial muscles deficient in tone, but lips in function.

Primary treatment started Sept. 2, 1928, and the teeth established in their normal relations by March 15, 1929 (approximately six months). By this time, marked growth changes were apparent in the body of the mandible which continued during the period of secondary treatment. Intermaxillary elastics were employed at intervals, and exercises for general facial development were carried out. The labial and lingual arch wires used during primary treatment were continued during secondary treatment until Dec. 18, 1933, when they were all removed and a Hawley appliance was installed upon the upper teeth and worn at night only. This is still being continued in use.

CASE 8.—(Fig. 17.) A boy eight years of age.

(A) Upper alveolar intraversion, mild in degree. Lower normal.
(B) Upper incisal retroversion. Lower bilateral dental, plus mandibular, retroversion, medium in degree. Body of mandible showing underdevelopment.

Fig. 16.—Case 7, a girl eight years of age.

(C) Upper incisal supraversion, extreme.
(D) Facial muscles deficient in tone, with lips malrelated.

Primary treatment started July 15, 1931, and the teeth, dental arches and jaws placed within the functional range by Dec. 14, 1932. At this time all fixed appliances were removed from the upper teeth, and a Hawley appliance, with a lingual shelf so placed that the posterior teeth were separated when the jaws were closed, was fitted and worn at night only. The lower lingual arch wire was left in place upon the lower teeth. By the time secondary treatment was in effect, marked growth changes had occurred in the body of the mandible. Exercises for general facial development were prescribed and followed by the patient with a moderate degree of faithfulness. Conviction is felt that unless this form of functional stimulation is adhered to through an adequate period, this case will not terminate satisfactorily. The muscles controlling the relation of the mandible are apparently in a satisfactory state of adaptation, having acquired this during the long period when intermaxillary elastics were worn. The canines and bicuspids are erupting in a satisfactory manner, and periodic roentgenographic examinations reveal the second and third molars developing normally. The case is still under secondary treatment.

It will be apparent from these case reports that in the treatment of dental and mandibular retroversions, a similarity of appliance technic is employed. To say that they require identical treatment, however, would be definitely misleading, for there is a vast dissimilarity in objectives. With mandibular retroversions, the supplemental growth problem assumes supreme importance, and the extent to which it is brought about determines the ultimate degree of success. To use a homely simile, we may compare treatment to a journey. With dental retroversions, we would travel, let us say, a thousand miles; while with mandibular retroversions our destination would be five or six or ten thousand miles away. The importance, therefore, both to the orthodontist and to the patient, of a correct diagnosis is obvious.

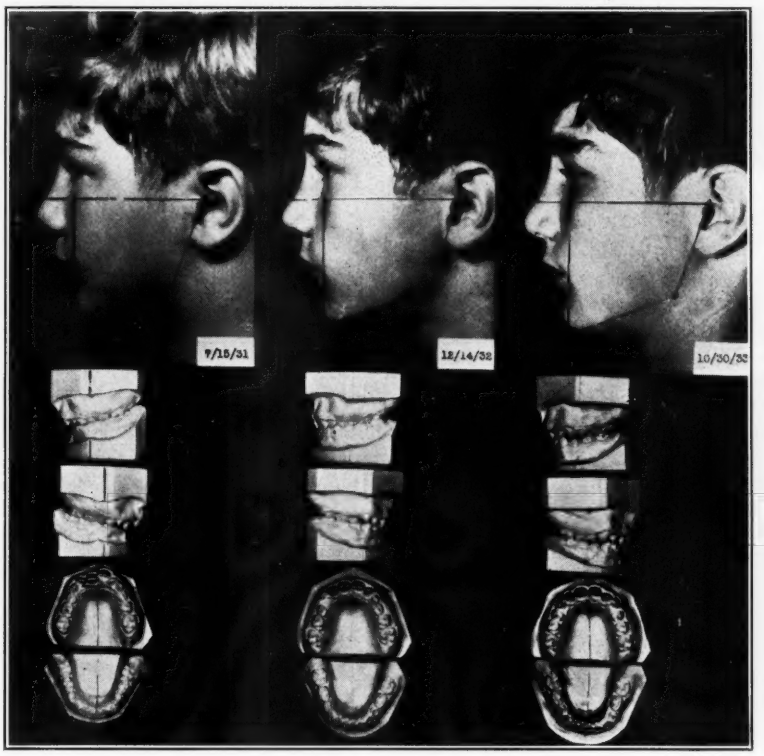


Fig. 17.—Case 8, a boy eight years of age.

We frequently encounter a pessimistic attitude toward orthodontics, the assertion being made that far too many failures are evident. It is true that numerous children have been subjected to treatment without permanent benefit. This, however, is not because orthodontics is basically incapable of coping with its problems, but to other causes, some of which I shall mention. First and foremost, numerous unqualified practitioners attempt orthodontic operations; second, the layman and the dental profession, for the most part, fail to take the problem seriously, to recognize it as dentofacial orthopedics, but still relegate it to the field of the dexterous arts; and third, all too many orthodontists assume toward it a casual attitude. This is disastrous, for unless we are in deadly earnest, unless we fight our way through these cases

step by step, utilizing every helpful means at our command, partial successes and many failures stand in the offing. To the practitioner, however, who is qualified, who has the capacity of gaining and holding the interest and the cooperation of patients and parents, who puts his mind and heart and soul into his treatment efforts, orthodontics offers an opportunity for benefits comparing favorably with the other high attainments of the healing art.

DISCUSSION

Dr. Max E. Ernst, St. Paul.—I should like to ask Dr. McCoy whether he can in a few words differentiate between his treatment of the mandibular and of the alveolar retroversion.

Dr. G. W. Grieve, Toronto, Ontario.—Dr. McCoy, at the very end of his paper, if I understood him correctly, spoke of the treatment of what he calls an ordinary dental retroversion, the completion of which he likened to perhaps one thousand miles away, while that of a mandibular retroversion, in comparison, would be ten thousand miles away. The latter distance describes pretty clearly the distance which stands between Dr. McCoy's idea of the treatment of a distoclusion case (so-called) and my own, which is farther apart than our respective cities.

I do not agree with the essayist at all in the use of intermaxillary elastics, particularly with a lingual wire upon the mandibular arch, in the treatment of a distoclusion case.

He speaks of a dental retroversion. On this point I am as far away from him again as it is from Japan to England; as in my opinion there is no such thing as a dental retroversion. I believe the teeth are never too far back in the bone in which they are placed, and that the general lack of this knowledge is responsible for most of our failures.

In all the pictures of treated cases which Dr. McCoy has shown, or practically all of them, I believe the maxillary incisors, and more particularly their root ends, should have been carried back more, in order to place them in their normal relation to the cranium and at their proper angle of inclination; this, too, would produce better facial balance. In my case report, to be presented this afternoon, it may be possible to visualize that great distance which exists between Dr. McCoy and myself.

Of course, I must say that Dr. McCoy has made some slight provision, in using the lingual wire, to prevent tipping of the teeth, but I still believe the use of intermaxillary elastics with any kind of appliance for the treatment of a distoclusion case is wrong. The late Dr. Hawley, at this Society's meeting in Buffalo, made a statement (I cannot give the exact wording) something to this effect: "I have only recently learned just what is taking place with the use of intermaxillary elastics in these cases." Dr. McCoy speaks of the pull of the elastics to help development of the muscles. I think that is very true; but, if you will follow my method of getting increased length of the mandible, you will produce such stimulation there for the development of these muscles that you will not have to "take a child to raise" in order to obtain in a reasonable time the necessary development and growth of the mandible.

In some of the cases Dr. McCoy showed he spoke of using a Hawley plate with a shelf. I do not know whether he used an inclined shelf or a flat one. I would not be in favor of one with an inclined shelf at all, because it tends to tip the mandibular incisors forward, which is not desirable, in my opinion. I would consider that in some of the cases shown the lower third of the face is much too long. Why facilitate, by the use of a plate, lengthening of the face, and thus further destroy the harmony and balance?

Dr. McCoy speaks of a cuspid-to-cuspid retainer being worn on the mandibular teeth until such time as the third molars erupt. If we place teeth in the position in which they belong, no retainer of any kind will be necessary. In my report I shall show a number of cases in which no retaining appliance at all was placed. One of these cases to be reported was the type under discussion. It was treated many years ago, under somewhat similar procedure as that outlined by the essayist, but with pin appliance on both maxillary and mandibular

teeth. A retaining appliance, with a bite crib, was worn for three years. About once a year this retainer was removed, and each time relapse commenced and it was again replaced. Finally I awakened, and, by means of inclined planes, obtained lengthening of the mandible. After completion of treatment by this change in my procedure, no retainers were placed, and I shall show casts made ten years after removal of treatment appliances, with an overbite of 1 mm.

Dr. H. L. Morehouse, Spokane, Wash.—I should like to ask just one question of Dr. McCoy in regard to his Hawley retainer. Why do you prefer to have patients wear those Hawley retainers at night only? I have always been under the impression, and have felt in my practice, that it was necessary to wear the Hawley retainers with the inclined plane continuously during mealtime as well as at night. The reason for this primarily was that I believe the forces of mastication exercise sufficient pounds pressure in driving force to prevent the vertical development of the alveolar process. The teeth come into their normal vertical relationship more readily than they would if the retainer were used just at night. I should like to have Dr. McCoy give his reasons.

Dr. L. H. Wirt, South Bend, Ind.—Dr. McCoy referred to the question of terminology, and I think he did a good job in making use of the terminology he brought up in that particular connection. I wonder how many times you read an article, or hear a lecture, in which you hear the words ''roentgenology'' and ''roentgenogram,'' that you do not think what an unfortunate thing it was that we use the inventor's or discoverer's name as applied to such things. Suppose the man who discovered these rays had been a Greek scientist by the name of Kasakopoulas, or an American by the name of Jones or Smith. Carry it out and see how strange it would seem. I do not see why we have to do that. Why do we not use terms that we use all the time, every day, among ourselves?

With regard to discussing mandibular retroversion, judged from clinical observation and speculation, I have come to wonder whether there are not some of those cases which have their origin even in prenatal life and possibly might be attributed to the erect posture of the human. As you know, the fetus is carried in the human being head down for a great deal of time. I have seen pictures showing conditions in which that fetus' chin was carrying the weight of the rest of the body, and I wonder whether that does not sometimes cause limited growth at least or perhaps a distortion of growth.

In discussing just the opposite condition, where there is prognathism, I believe it is pretty generally accepted that some of those cases have their origin in infantile breathing impairment from adenoids, enlarged tonsils, or something of that nature which causes them to project the jaw forward in order to be able to breathe comfortably. By doing that over a long period of time, it seems that the mandible becomes developed forward. If distorted function of that nature will cause the mandible to grow forward and grow larger, it struck me that possibly we might harness that force, you might say, to correct the condition of retroversion of the mandible. I have been working on some experiments calculated to bring the mandible forward by certain exercises, which I have not gone far enough with yet to know how it is going to work out. I am wondering whether I am on the right track.

Dr. Alfred P. Rogers, Boston.—I am able to offer no real criticism of this paper because it is so very true to my own way of thinking. Dr. McCoy has illustrated the influences of myofunctional treatment to you better than I have been able to do. This paper will be of very great assistance to the student of orthodontia in the future.

One suggestion that perhaps might be of value is that in my own practice when the time arrives for the removal of all fixed appliances I have the patients exercise daily upon a Hawley removable retainer with a specially constructed bite plane. After the bicuspids and molars have come into occlusion, they use the bite plane at night only, gradually ceasing the use of it altogether.

In speaking of the mandibular retroversion cases I think some articles I have recently published illustrate very well the changes which take place in the mandible and particularly in the temporomandibular joint. When a child of this type finally comes to the point where

he holds his mandible in its correct anatomic position during the acts of speaking and deglutition, then you may be assured that sufficient change has taken place in the mandibular form to assure a definite and permanent cure.

Dr. James D. McCoy.—Dr. Ernst, from the standpoint of appliance technic and what we do to the teeth, our treatment measures are very similar, but the great importance of supplemental growth in mandibular retroversions means your efforts must be continued far longer. I tried to describe that by comparing it to a journey. I know that in going through the treatment of those eight cases you probably were impressed with the promptness with which the dental retroversions were terminated, and you also were probably impressed with the fact that certain phases of treatment in the mandibular retroversions occurred very promptly. The need for supplemental growth does not always occur as quickly as we would like to have it; although with such growth deficiencies apparent we cannot expect miracles to occur. When you get a mandibular retroversion, sometimes you get a child to raise.

I am glad to have my friend George Grieve discuss this paper, and I was glad he prefaced his remarks by saying that we were miles apart in our ideas on treatment. I believe he said fifty thousand, anyway, which is about correct.

I have labored with him on more than one occasion in an effort to get him to record his cases so he would actually find out what he was accomplishing with them by treatment. I could never make any impression upon him. As an evangelist I am evidently a total flop, but I am going to call George's attention to a little instance that comes down to us through the Bible. The apostle Paul once took a trip from Jerusalem to Damascus, and on the way down he saw a great light which blinded him and he fell off his horse. George, if you would just start in and record your cases as I do, I will promise that you will get knocked clear off your horse.

In answer to Dr. Morehouse's comments, I have found we get along just as well having our patients wear the Hawley appliance at night only as we did when we had them wear them day and night. Inasmuch as the orthodontic problem is a growth problem, we feel that if we let the teeth and their adjacent structures "stand on their own feet," if we want to put it that way, and function during meals, growth changes are actually favored. We get along just as well that way, and it saves the patient the necessity of wearing it during the rest of the period.

I want to thank Dr. Rogers and Dr. Wirt for participating in the discussion.

I might say, in regard to the roentgen terminology, that in the field of medicine a man who utilizes the x-ray for any purpose is known as a roentgenologist. I feel that Roentgen gave us one of the greatest agencies for the benefit of mankind which has ever been discovered, and out of deference to him we should prefix his name and speak of "the roentgen ray," or "the science as roentgenology," or to refer to a "roentgenologic examination." The terminology is really not difficult. Just try it on your tongue, Dr. Wirt, and it works fine.

Referring to the matter of etiology, that is a big subject with which my paper was not concerned.

In regard to the limitations of treatment, that is a subject in which many things come into play, such as the cooperation of the patient, the skill of the orthodontist, and the limits laid down by heredity. You cannot expect to go beyond this last named factor, but, if we make it possible for the patient to have everything which his heredity entitles him to have, we will have done a mighty fine thing.

I want to thank Dr. Rogers for his remarks, and his explanation of the use of the exercises with the bite plane. I neglected to state in my paper that in many instances we have our patients take their exercises with their Hawley appliances in place.

MANIFEST EVIDENCE OF THE CAUSE OF RELAPSE IN MANY TREATED CASES OF MALOCCLUSION

GEORGE W. GRIEVE, D.D.S., TORONTO, CANADA

IT WAS necessary to select a title for this report before the material was decided upon, and in my enthusiasm I suggested an outline which will be rather difficult to cover in the time available for a presentation under the heading of case reports. However, I am to have the privilege later of presenting a lecture clinic, at which time it is hoped that sufficient additional evidence may be demonstrated to cause those with open minds at least to give earnest consideration to the theory of malocclusion which I believe to be the correct one upon which to base our procedure in making an analysis.

This theory has not, so far as I know, been given a definite name; so I shall designate it the "forward translation theory." It is based upon John

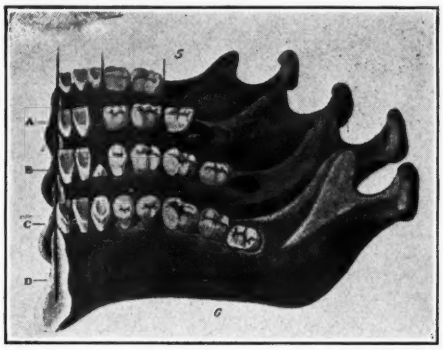


Fig. 1.

Hunter's description of the growth of the jaws from birth onward, which may be found in detail in J. Sim Wallace's work.[1] Fig. 1 illustrates the growth of the mandible, as described by Hunter, according to whom the permanent maxillary molars, in normally developing jaws, never come to occupy any of the space in the dental arch originally occupied by the deciduous denture, and in the permanent mandibular molars move forward only a little, due to the large second deciduous molars.

In civilized races there are, apparently, very few normally developing jaws, but Waugh has seen them in Alaska and Price in isolated portions of Switzerland and the Hebrides. The reports of these investigators are familiar to all.

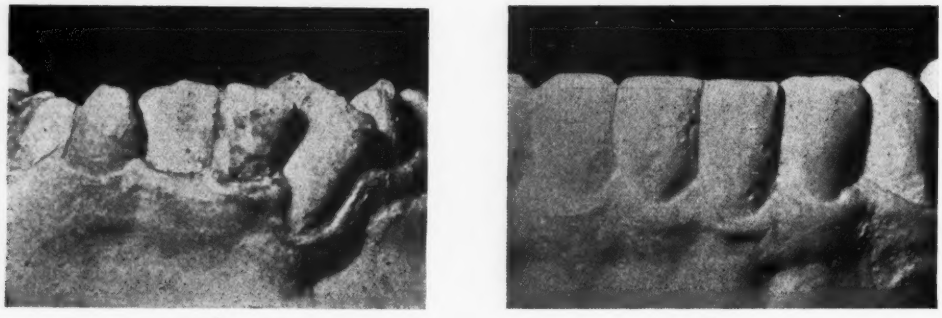
Excessive overbite and overjet, so common among people with whom we come in contact in our work, result chiefly from insufficient growth of the

Case report presented at the Thirty-Fourth Annual Meeting of the American Society of Orthodontists, St. Louis, Mo., April, 1936.

jaws and consequent forward translation of the teeth. Orton and Lischer,[2] in the report of their study of the dentures of almost three thousand students in the University of California, established what may safely be adjudged the amount of a normal overbite—not more than 1.5 mm.

One of the most constant factors which present in malocclusion is the excessive overbite, which the late J. Lowe Young, than whom there have been few, if any, more skilled orthodontists, very often said was "the most difficult problem in orthodontia." Under skillful treatment, based upon the forward translation theory, this problem becomes a minor one, the chief difficulty being anchorage. In the average case there is very rarely any doubt in my mind as to what are the normal dentocranial relations; the greatest problem in correction is to obtain sufficient anchorage from which to apply the correct stimulation to nature to bring about the necessary reconstruction.

We are now all pretty well in agreement that the horizontal growth of the jaws takes place occipitally, the developing molars playing a definite part in bringing about this enlargement. Function of the dental apparatus sup-



A. *B.*

Fig. 2.—In the original cast the left lateral incisor lies lingual to the central incisor, and the photograph makes them appear as one abnormally wide tooth.

plies the chief stimulus to general growth and development of the jaws, and when we consider modern diet it becomes quite evident how deficient is this important factor. Thus, in most individuals, there is not sufficient horizontal growth of the jaws to permit the eruption of the permanent molars without more or less forward displacement of the teeth in front of them, and to some extent the alveolar bone surrounding their roots, the whole dental arch being forced into a position anterior to its normal relation to the apical base and to the cranium.

At least some of the receding gingival margins which we see demonstrate that the teeth are out beyond the apical base. Dr. A. J. McDonagh, Toronto, a prominent periodontist, substantiates this claim. Fig. 2 illustrates this point, and shows a close-up picture of the labial aspect of the original and finished mandibular casts of a case of a young boy treated by Dr. G. Vernon Fisk when he was associated with me. Such recession had taken place overlying the left central incisor, which had been forced labially too far, as shown on the left. Where this tooth has been carried back to its normal relation to the base, as shown in the picture on the right, the gum margin is almost wholly

restored. Dr. McDonagh's explanation is that this breaking down of the alveolar margin is due to excess pressure of the labially displaced tooth interfering with the normal circulation of the blood to the gingivae.

Fig. 3 shows a case from my own practice, where definite forward translation of all the teeth had taken place. So-called normal occlusion was established in treatment, as shown in B casts on the left, but the teeth were never carried back to their normal relation to the apical base. Note the receding gingival margins over the mandibular incisors. This case was treated many years ago, and the recession is still greater today, as shown in C casts. The maxillary second molars and the mandibular third molars had to be removed several years ago, some of them being impacted.

Apropos of this problem of receding gingival margins, see Fig. 4, a patient forty-eight years of age, in which there is extreme recession over all

Fig. 3.—Space for maxillary lateral incisors partially closed, and for the right mandibular lateral incisor almost entirely.

teeth shown except the right lateral incisor, which had carried a porcelain crown for sixteen years. This crown was placed by a dentist who always removed the enamel and cementum under the gum margin when placing a crown, thus relieving the pressure upon the overlying tissues in this area. Fig. 5 shows, in an adult mouth, another crown, with full band, placed by the same operator when the patient was fifteen years of age.*

My first definite step in putting into practice a radical change in technical procedure in treatment was taken in March, 1921, at which time I thought, as did Dr. Angle and others, that all cases in Angle's Class II (so-called distoclusion) had a short mandible. Fig. 6 shows casts of a case in this class, and Fig. 7 a profile picture of the boy, nine and one-half years of

*A paper by Dr. McDonagh, covering this phase of the subject, was published in the Journal of Periodontology, January, 1933. I desire to extend to him my thanks for his assistance and for the loan of his slides illustrating this point.

age when treatment was started with pin appliance in January, 1916. The vertical line on the photograph was not drawn at that time; I shall discuss this later. In June retainers were placed, with a crib bite plane. In October the four first deciduous molars were removed and the active appliances replaced. In the following March retainers were again placed, with bite crib. These were worn almost continuously, being removed about once a year, and the teeth left free for a time to see whether the case would hold. It did not,

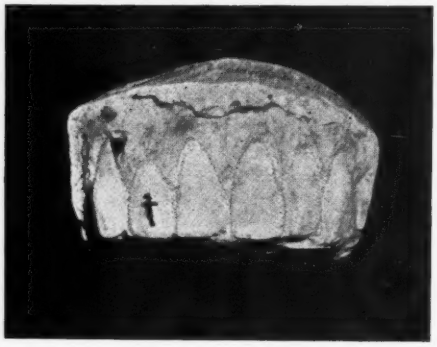


Fig. 4.

Fig. 5.

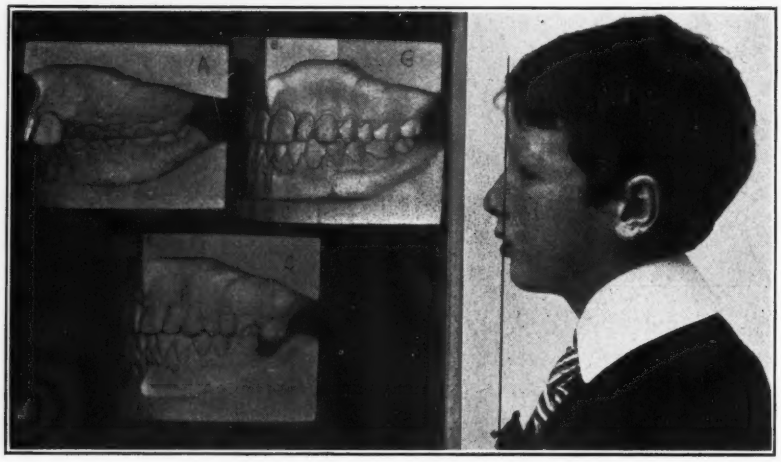


Fig. 6.

Fig. 7.

so a little further adjustment was made each time and the "splints" were replaced. This fool business continued for four or five years, with no sign of success. About the beginning of the year 1921 I had conceived the idea that the supposedly short mandible in these cases was the cause of failure, and it was at this time I registered upon the original photograph my interpretation, at that time, of what Dr. Angle had at one time termed the "line of harmony," his illustration of which is seen in Fig. 8. (The line of harmony upon the face of my patient was not properly placed; it should fall farther back in its lower part, the mandible not being as short as this line would indicate.)

To my mind the Apollo represents somewhat the mental eminence type, in which face, however, the eminence is very slight. The line of harmony in this type should, I believe, fall a little farther back in its lower part than as placed by Angle, the amount of the eminence extending forward of the line to be governed by the extent of the development of the eminence. In March I replaced pin appliances, with steep incisor planes (the deep overbite being the troublesome factor), with the hope that I could stimulate horizontal growth of the mandible. It worked, and in April, 1924, all appliances were removed, and no retention of any kind was placed. Fig. 9 is a photograph of the boy at that time, and casts marked B in Fig. 6 were made one year later. A large amount of the time spent previous to the change in procedure was wasted. This lad's case was originally reported at the Atlanta meeting of this Society, but we have now gone one step farther. In January, 1935, nearly

Fig. 8.

eleven years after removal of appliances, we made casts again, marked C in Fig. 6. Unfortunately, during this interval between B and C casts, through lack of care on somebody's part, some pulps became involved, and the boy changed his dentist. The new dentist, being one of those who does not believe in retaining pulpless teeth, removed the mandibular left second molar, the maxillary left lateral incisor and second premolar, and the maxillary right second premolar and first and second molars, and placed a maxillary partial denture. The third molars had been removed some time before. Notwithstanding this calamity, note the occlusion and overbite. See also his photograph, taken in January, 1935, shown in Fig. 10. It looks as though the final method of orthodontic procedure was not far wrong.*

*Original detailed report of this case may be found in the 1925 Proceedings of this Society, and in the Dental Cosmos for April, 1926. If any one should look up the report in the 1925 Proceedings, I would like to grasp this opportunity to correct an error which crept into it. The paragraph immediately preceding Fig. 31 should end with the words "are moved forward in the bone." What was in my mind was that it is impractical, if not impossible in some cases, to move teeth bodily *back* in the bone.

Now, let us look at a Class I (neutroclusion) case, which has been reported partially in some former papers, and fully before the Pacific Coast Society of Orthodontists a little over a year ago. Fig. 11 shows original casts. Note that both the maxillary and the mandibular left deciduous canines, as well as the mandibular right first deciduous molar, have been shed and the spaces very markedly closed by the forward translation of the posterior teeth, the forward displacement in the maxilla being slightly greater than that in the mandible. The boy was eight and one-half years of age when treatment was commenced in March, 1919. The overbite was 4 mm. Lingual wires were placed, with a crib bite plane on the maxillary arch, supported, possibly, by the central incisors. Details are lacking in my records, but

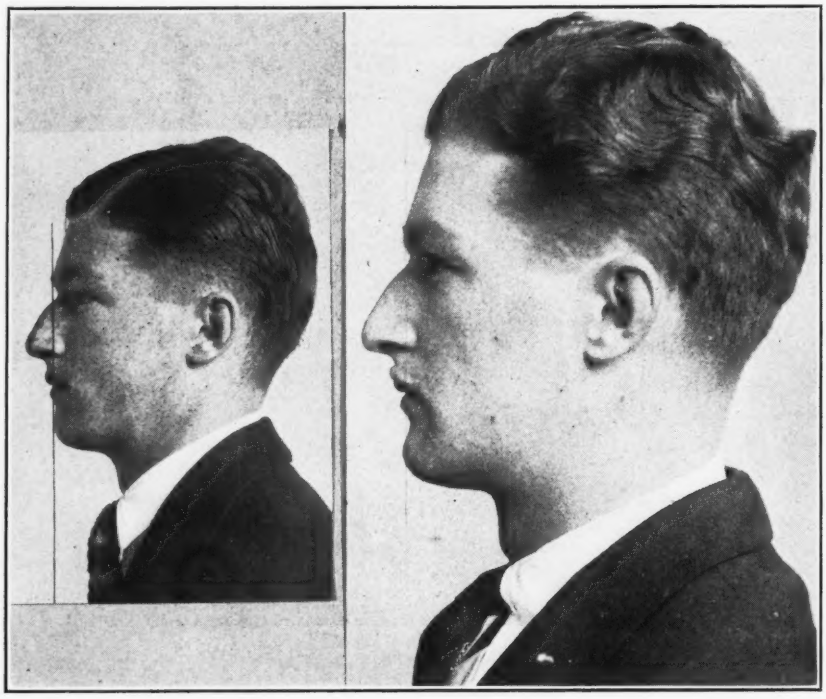


Fig. 9. Fig. 10.

about fifteen hours was spent up to the end of that year upon the case, and only nine and one-fourth hours during the following year—1920. During the first half of 1921 seventeen hours were given to the case—about half-and-half by myself and an associate, during which period a considerable change in appliances was made, of which we have no definite record. In the middle of June the appliances were removed, as I remember due to a feeling in the minds of the parents that "the teeth were good enough." We did not see this boy again until about the end of 1922—more than a year later, and again in March, 1923, each time for inspection. In December, 1923, a consultation with the boy's father was held; and in January, 1924, the second pair of casts was made, shown in Fig. 12. The overbite was now 2.5 mm., and there was considerable interference of the canines. Appliances were replaced, lingual

wire on maxillary arch, with possibly the bite crib again, and pin appliance on the mandibular teeth. In October, 1925, the photographs shown in Fig. 13 were taken. In these he looks as though he might belong to the straight type,

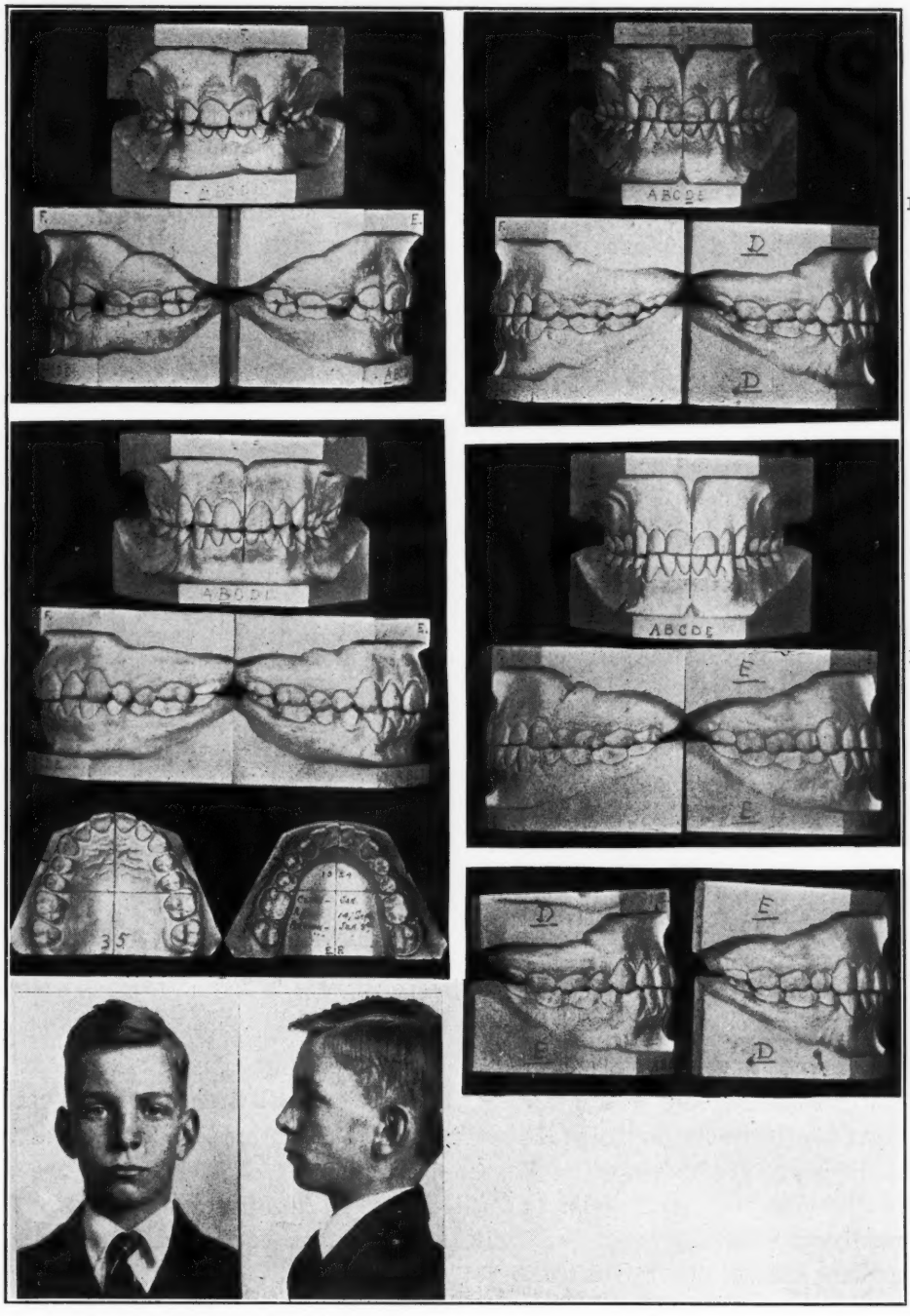


Fig. 11.

Fig. 12.

Fig. 13.

Fig. 14.

Fig. 15.

Fig. 16.

and his skull was definitely dolichocephalic. He was then about fifteen years of age. At that time a pin appliance was placed upon the maxillary teeth in order to get rid of all interference. By the following March both arch forms were regular, but too broad; the mesiodistal relations were normal, and there

presented a double protrusion. About the middle of June all appliances were removed for the summer, upon request of the parents. It was then 1926, and seven years of valuable time, alternately tinkering and waiting, had been wasted.

I had now finally awakened to a realization of the fact that malocclusion, as a general rule, was the result of a forward translation of the teeth; and in this case the forward displacement was so great, both in maxilla and in mandible, that it was impossible to carry the teeth back to their normal relation to the apical base. In October both parents were called in, and the problem was explained. They consented to the removal of all four first premolars. This was the first instance in my practice in which this radical procedure

Fig. 17.

was resorted to. It was only after many months of careful study and consultation with several of my confreres, including Young and Pullen, that this step was taken. Pin appliances were placed upon both arches, with U springs to start the intrusion and distal movement of the canines. When these were back in contact with the second premolars, pins were placed upon the arch wire for these teeth and springs adjusted to the lateral incisors to carry them lingually and distally, as well as any intrusion necessary, and later the same procedure for the central incisors.

By April, 1928, all interference had been removed, and buccal planes were adjusted to stimulate the necessary lengthening of the mandible, as there was still a slight distal relationship of the mandibular to the maxillary teeth. At the end of another seven months—in November—this growth had been obtained, and all appliances were removed, and no retainers of any kind

placed. Casts were not made at that time, but eleven months later D casts shown in Fig. 14 were made, and there was then an overbite of slightly less than 2 mm.; all third molars were nearly in occlusion. Sufficient anchorage had not been enlisted in the mandible during the closing of the spaces, only the second premolar and the first molar being utilized, and the canines and the incisors had not been carried back quite enough, nor had the canines in both arches been intruded sufficiently. As a result of this error in detail a

Fig. 18. Fig. 19.

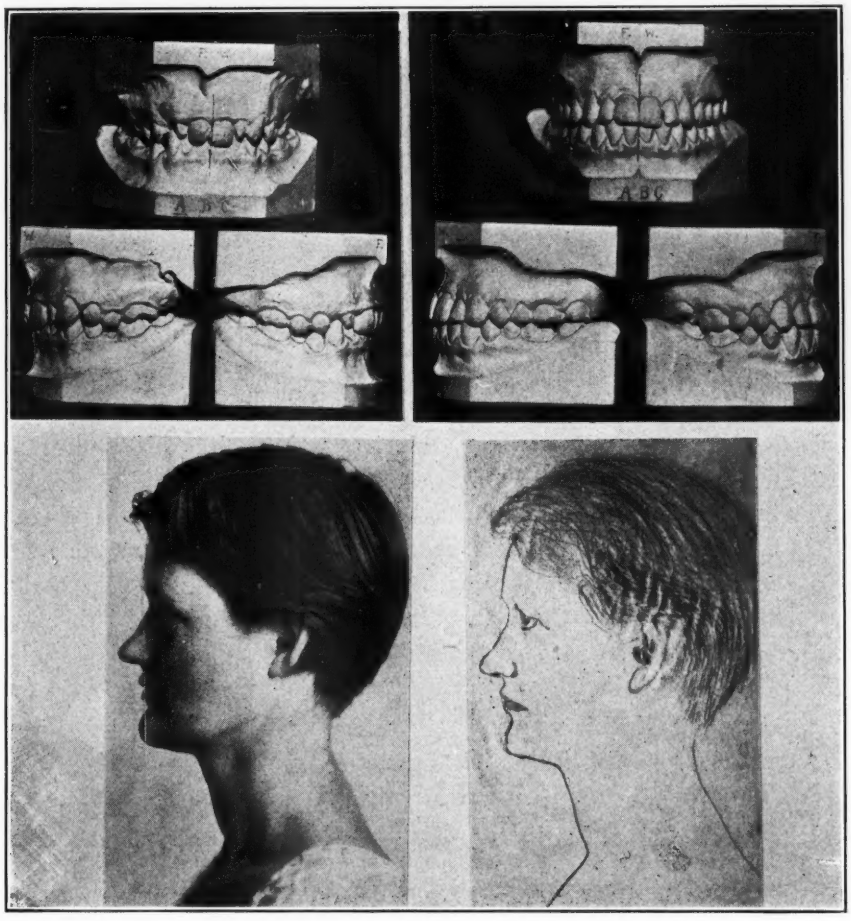


Fig. 20. Fig. 21.

very slight crowding of the mandibular incisors and a little narrowing of the mandibular arch had taken place, due to interference. Had the mandibular anterior teeth, during treatment, been carried back just a little more, and the posterior teeth not allowed to move forward this amount, the mandible itself could have been lengthened just a little more, which would have produced still better facial balance for this type. Five years later—January, 1935—E casts shown in Fig. 15 were made. There was no detectable change in the interval except a slightly less overbite—now 1.5 mm. All third molars were in occlusion. Fig. 16 shows D and E casts occluded—the maxillary of one

with the mandibular of the other. (We have found in many cases this same possibility of occluding casts, made several years apart, both in cases in which all teeth were retained and in cases in which teeth were removed.) This speaks for itself. Fig. 17 shows profile of patient, twenty-four years of age when E casts were made. He is the mental eminence type, and the *apparent* lack of fullness in the dental area is normal for this type if the teeth are in correct relation to the cranium, as I have brought out in former contributions.

We shall now discuss another neutroclusion case, a girl fifteen years of age when treatment was commenced. Already there was development of the chin which marked her as the mental eminence type also. Fig. 18 shows the casts. The overbite was 5 mm. There were maxillary peg lateral incisors, and the normal space for these teeth had considerably closed; the right canine had not yet erupted, and half of its space was closed; the premolars and the molars were displaced forward. The maxillary arch was a little under normal width in the premolar region, and normal in the molar region. The mandibular arch was almost normal in width, except that the first molars had their mesiobuccal corners rotated slightly to the lingual, and the forward translation of the molars had displaced the second premolars lingually.

Pin appliance was placed on the maxillary arch and lingual wire on the mandibular arch in February, 1924. In July pin appliance was substituted for lingual wire on mandibular arch. At the same time the mandibular right first molar was removed, because of pulp involvement. Later the mandibular left first molar was removed, as it was found that the molars on this side would otherwise have to be moved back, and this tooth carried a large amalgam filling. The maxillary right second molar was removed at the same time, as there was considerably more forward translation of the teeth in this arch on that side than on the left. There was no maxillary third molar on the left. We were now down to twenty-eight teeth, which we shall later see was sufficient tooth material for the base available to carry.

It was found desirable to carry the maxillary buccal teeth on both sides back somewhat, and occipital anchorage was applied, but this girl, hypersensitive and studying hard, was never able to use it successfully.

In March, 1931, pin appliance was removed from the mandibular teeth, and in May a lingual wire was placed. In December the pin appliance was removed from the maxillary teeth, the lingual wire having been previously removed from the mandibular teeth. No retention of any kind was placed. At this time porcelain jacket crowns were placed upon the maxillary lateral incisors. Casts were not made until June, 1933, one and one-half years later. These are shown in Fig. 19, and the overbite at that time was a little less than 2 mm. Fig. 20 shows a profile picture of the young lady one year later, at which time she was twenty-five years of age. The mental eminence is very prominent, and thus accentuates the apparent lack of development in the dental area characteristic of this type; but, as I have said before, the disharmony does not lie in the dental area, but is due to overprominence of the mental eminence, as is evidenced by Fig. 21, which is an exact tracing of the facial outline of the same picture, all but the mental eminence, a portion of

which has been omitted. The disharmony has disappeared, and its location has been thus established. This type, when the mental eminence is not too marked, is the finest type of face we have among us. The original, glorified by Gibson, is the girl in the moon. If we look through the advertising pages and story columns of the magazines, we find that where faces are reproduced, from either photographs or drawings, they are invariably of this type. Fig. 22 shows a sketch of the profile of a Roman warrior of this type. Note the symmetry and beauty of this face.

The young lady, whose case I was discussing before I wandered back to the Romans, was called in for another pair of casts this month, and as I could detect no change in the denture I felt it was not fair to ask her to submit to these impressions. The appliances have now been off for four years.

In practically all cases in which the third molars were present, which I have corrected without the sacrifice of any teeth, the third molars have

Fig. 22

eventually had to be removed. Very few of us these days develop jaws sufficiently large to accommodate the full complement of teeth, and as a result we nearly all have more or less forward translation of some or all of the teeth. It is impracticable, if not impossible, in many instances to put all teeth back to their normal relation to the cranium, and where this movement is attempted we invariably get impaction of third molars. A large number of operators now recognize this fact.

I had intended to show some cases which lapsed, treated upon the old theory, but time does not permit. However, what good would it do, anyhow? It would only be a useless expense for slides and illustrations, as well as a waste of time, as we have all seen hundreds of them.

The credit for what we may call the "forward translation theory" of malocclusion must go to J. Sim Wallace of London, as he propounded this theory in his *Essay on the Irregularities of the Teeth,* published in London in 1904. May he, and many more of us who hold this view, live long enough to

convince the orthodontic world of the truth of this theory. Personally, I had come to the same conclusion as Wallace more than ten years ago but, unfortunately, had not been acquainted with his work upon the subject until his more extensive work, *Variations in the Form of the Jaws,* was published in 1927. This latest work of his is worthy of careful study by every practitioner of the science of orthodontics.

The results in the cases which it has been my privilege to report at this time should, to some extent at least, substantiate the correctness of this theory, and at the same time present "manifest evidence of the cause of relapse in many treated cases of malocclusion."

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ARRESTED ROOT ABSORPTION DURING ORTHODONTIC TREATMENT

J. Lyndon Carman, D.D.S., Denver, Colo.

IN PRESENTING this case report it is not for the purpose of showing a finished case of orthodontia but for the purpose of showing how the medical profession helps the orthodontist in obtaining a more favorable prognosis for his case.

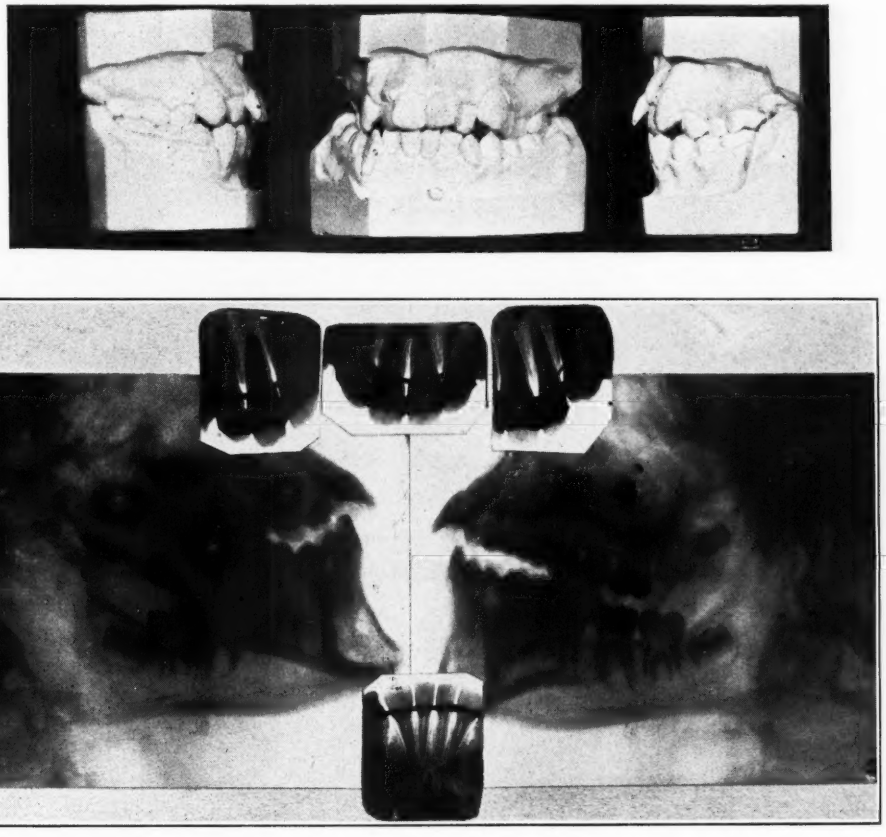

Fig. 1.—Models and roentgenograms of the case one month after orthodontic treatment was started.

History.—The girl, fourteen years of age, presented a neutroclusion case with a lingoversion of the maxillary right side with marked irregularity in the premaxillary region. An older sister presented a similar type of malocclusion. Two other sisters of the family had normal mouths. The patient had never had any prolonged or serious illnesses; her tonsils and adenoids

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had been removed. Her height was 58″, weight 89 pounds. The child was apparently in good health, but had a very nervous temperament.

Etiology.—Both the mother and the father had extreme cases of malocclusion. The patient had hypothyroidism, hypocalcemia, hypoglycemia.

Diagnosis.—Expansion of both the maxillary and the mandibular arches and the rotating of the maxillary and mandibular anterior teeth into position. (Fig. 1.)

Treatment.—Lingual arches for both maxillary and mandibular arches were placed with molar anchor bands. Anterior precious metal bands were

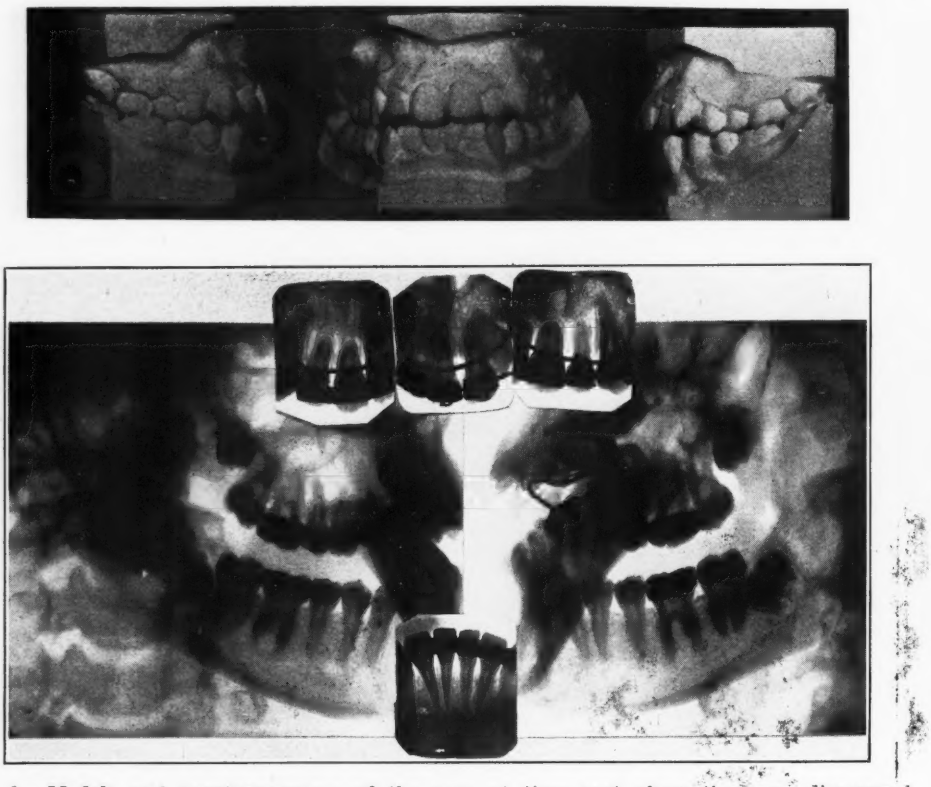

Fig. 2.—Models and roentgenograms of the case at time root absorption was discovered.

placed and brackets were used; 0.020 labial body wire was used for the purpose of moving the anterior teeth. The case was treated for nine months with this method. Roentgenograms were then taken showing marked root absorption. All appliances were removed, and the case was referred to the family physician who examined the patient and reported that the child was normal with no systemic conditions manifested. The patient was advised to increase her nutrition, such as eating more citrous fruit, green vegetables, etc. The case was then allowed to rest for six months.

The appliances were again put on, and treatment was instituted for a year. Roentgenograms revealed a greater degree of root absorption. The case

was then referred to Drs. Connor and Maier, prominent internists of Denver. We presented our problem to these men. On examination they presented the following laboratory findings of the case. Blood chemistry: sugar, 80 mg.; plasma calcium, 7.9 mg.; plasma phosphate, 3 mg.; blood cholesterol, 178 mg.; basal metabolism, minus 10, minus 6, minus 8. (Compare the above with the normal for this individual: sugar, 100-120 mg.; plasma calcium, 10 mg.; plasma phosphate, 4 mg.; blood cholesterol, 140 mg.; basal metabolism, minus 5-plus 5.)

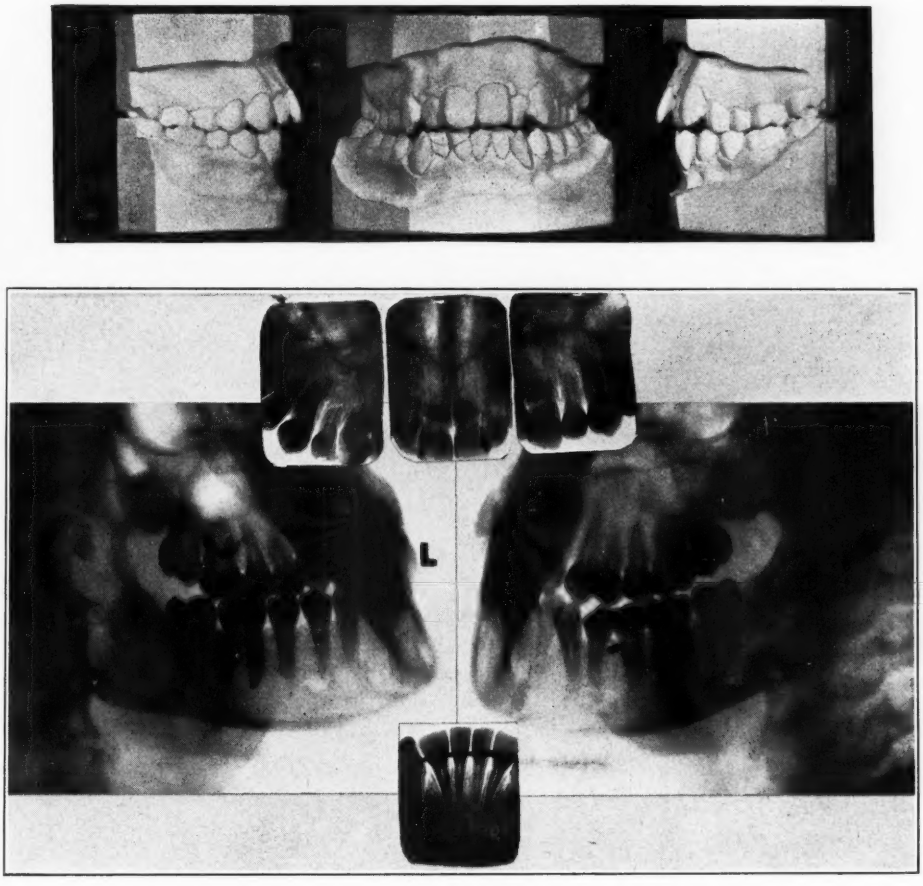

Fig. 3.—Models and roentgenograms of the case when orthodontic treatment was instituted a second time.

Physical Examination.—Head: eyes, throat, nose and ears normal. Chest: heart normal in size, no murmurs, rubs or thrills. Blood pressure 112/78. Abdomen, no masses felt, slight tenderness over lower abdomen. Reflexes normal. Skin dry and rough.

Diagnosis.—Hypothyroidism, hypocalcemia, hypoglycemia.

This patient was given one teaspoonful calcium gluconate and thyroid two grains after every meal, and placed on a high sugar diet with triple pancreatic extract after every meal.

After treatment of one year she made a marked improvement in gain of weight. Quoting from Drs. Connor and Maier's report, "This type of thyroid deficiency, although of not a very low basal metabolic rate, should be given thyroid very carefully for they do not tolerate thyroid as well as the fat overweight hypothyroid person. No improvement in the hypocalcemia, and hypoglycemia will take place unless all the glandular deficiencies are looked after."

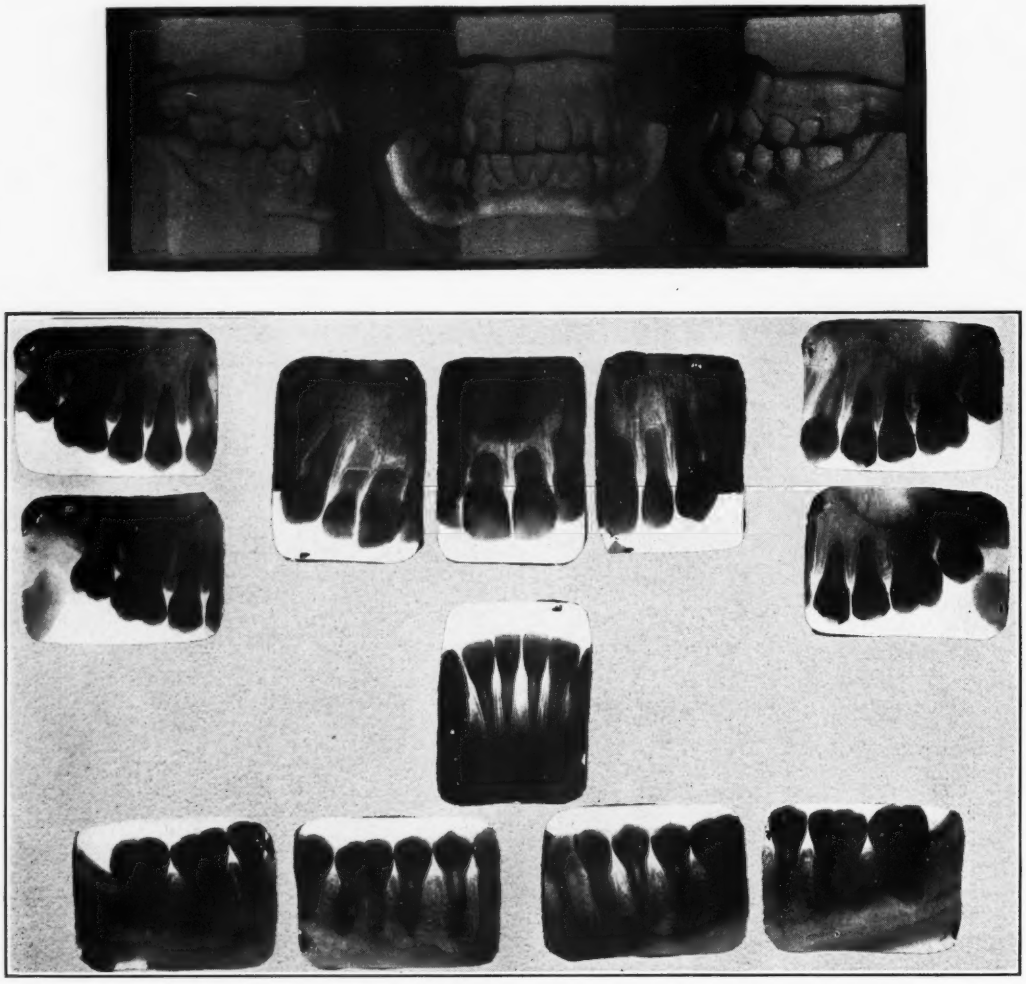

Fig. 4.—Models and roentgenograms at the time retainers were placed.

Orthodontic appliances were again put in place. At this time the advent of chrome alloy had come into our practice. All teeth were banded with chrome alloy, using channel brackets. In these channel brackets were used a twin 0.010 labial body wire. All radical movements were obtained with this type of arch. An 0.016 wire was placed for the final movement of the teeth. This treatment took place in approximately a nine-month period. Very little soreness or loosening of the teeth was noticed. Appliances were re-

moved, and a maxillary Hawley retainer and mandibular lingual arch were placed. Nine months after the mandibular lingual arch was removed, subsequent models were taken which showed very little relapse in our treatment.

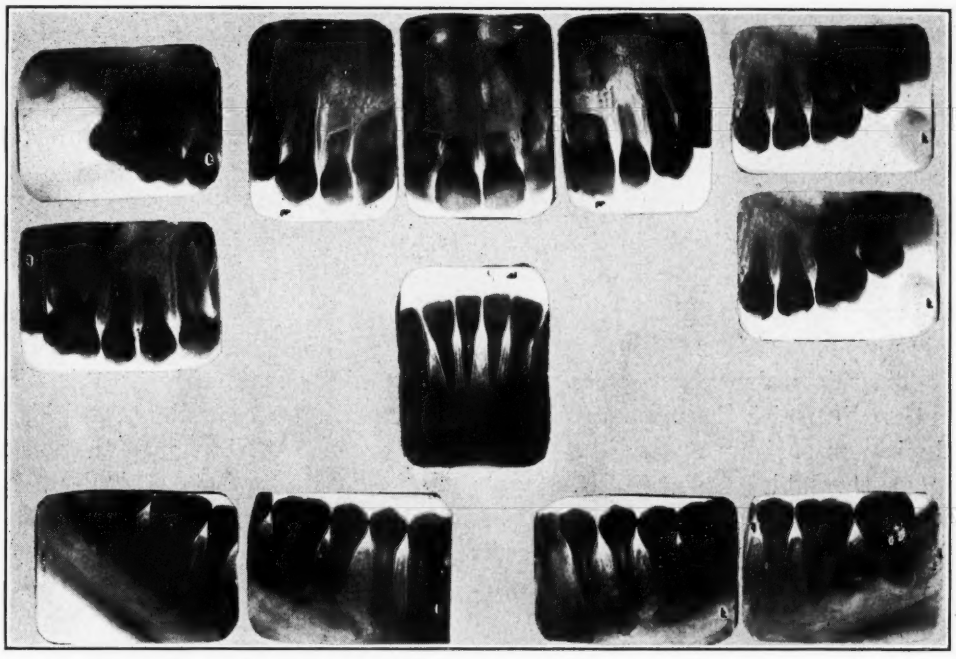

Fig. 5.—Models and roentgenograms one year after all appliances were removed.

The conclusion of this case is that root absorption was arrested during orthodontic treatment and the case carried on to a completion due to the aid of proper medical treatment in the correction of glandular deficiencies, as well as the hypocalcemia and hypoglycemia.

TREATMENT OF MAXILLARY INCISORS IN MIXED DENTURE CASES TO PREVENT CUSPIDS FROM ERUPTING LABIALLY TO THE LATERAL INCISORS

H. L. Morehouse, D.D.S., Spokane, Wash.

IN considering the treatment of mixed denture cases, one of the first points to be decided should be to what extent the treatment will act as a preventive measure. In other words, orthodontics at this age should result in eliminating as far as possible many of the complications that otherwise would be sure to occur.

It is impossible to select a definite age when such orthodontic treatment should be instituted. The operator must depend on what the radiograph discloses regarding the absorption of the roots of the deciduous buccal teeth and the development of the permanent incisors. If the deciduous cuspids and premolars have started to absorb, the chances of obtaining much stimulation through their movement, for bone growth, would be very slight and would rather hasten the absorption and cause their early loss.

Should the radiograph disclose that nature had not begun the process of absorption, then the first step in the treatment of these cases is the lateral development of the maxillary arch in order that the incisors may be brought into their normal positions.

The mixed denture cases, which I wish especially to consider in this clinic, are those in which the radiograph discloses the permanent maxillary cuspids developing on such an angle that if allowed to continue their course they would engage the labial surface of the roots of the maxillary lateral incisors and eventually erupt labial to the lateral incisors. (I am not going to classify these cases into any specific classes.) If some preventive measure is not instituted at this point, the cases in a year or two will have developed from comparatively simple cases into complicated ones.

In these cases there is always a lack of lateral growth of the maxillary and mandibular arches, which must be taken care of first. This lateral growth can be stimulated by either a lingual or a labial arch. I have usually used the lingual arch and finger springs.

After this lateral expansion has been accomplished, it is necessary to resort to a labial arch. There are two types of arches with which I have had the best success, the Angle ribbon arch with bracket bands on maxillary incisor teeth or an 0.030 or 0.032 plain labial arch with vertical finger springs soldered to it.

In many of these cases it is not necessary to create the vertical movement of the roots of the central incisors, in which case it is necessary to band only the lateral incisors.

If the Angle ribbon arch is used, proceed as follows after the lateral growth movement has been accomplished. Place Angle bracket bands on maxillary incisors, then adjust the ribbon arch so that it will slip into brackets on the lateral

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incisors in a passive state. With a pair of pliers create just enough torsion in the arch where it enters the brackets so it cannot be replaced without a little spring movement. This adjustment must be renewed whenever the arch has become passive in the brackets again. The case shown in Fig. 1 was treated with the ribbon arch.

If the plain arch is preferred, follow this technic: Place plain bands with McCoy open face tubes attached on the maxillary lateral incisors, being sure to place McCoy tubes as high gingivally as is safe for the soft tissue. Then fit an 0.030 or 0.032 plain labial arch with molar loop spring stops. On this arch

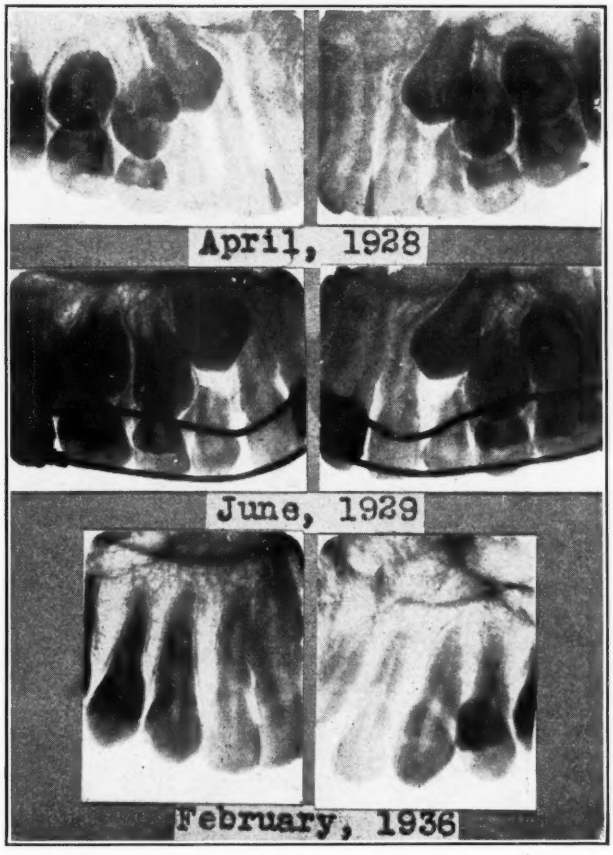

Fig. 1.

solder vertical finger springs of 0.022 wire, these should preferably be placed on the arch so that when the arch is locked in the tubes they will lie just to the distal end of the McCoy tube. Then place the arch in the mouth in a passive state, the vertical finger springs lying passive with the long axis of the tooth and the end about one millimeter from the incisal edge. Now the arch is ready for the work adjustment. Remove arch from McCoy tubes; then with a pair of pliers carefully bend the vertical finger until the end rests on the labial surface of the tooth and the main arch rests just at the opening of the McCoy tubes. See that the molar loop is resting at the mesial end of the buccal tube on the molar band. Everything is now ready to snap into place and lock. The case shown in Fig. 2 was treated with this method.

The vertical root movement is the same in both these appliances, the chief object of which is gradually to tip the lateral incisor roots forward through the bone until they are beyond the point where it would be possible for the maxil-

Fig. 2.

lary cuspids to become impacted and they will be forced to drift distally into their proper channels.

In a great many cases this method will prevent a secondary treatment of the cases after the permanent denture has fully erupted. It will always pre-

vent the cuspids from erupting labially to the incisors and complicating the case. If the radiograph discloses the permanent cuspid in a labial position covering half or more of the lateral root, then this treatment would be contra-indicated. Fig. 3 shows four radiographs of cases in which the position of the maxillary cuspids made it inadvisable to treat by either of the above methods. As will be seen, the maxillary cuspids were lying so far labial to the roots of the lateral incisors that it would be impossible to move the lateral roots in the manner already described in this paper.

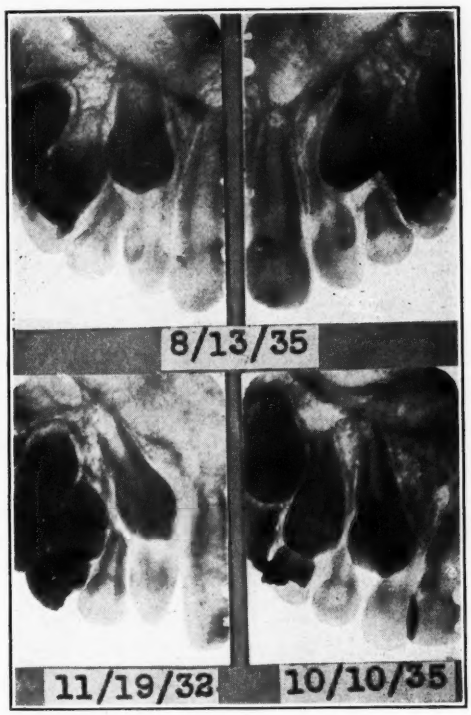

Fig. 3.

The question has often been asked whether I have not found the vertical root movement, at a time when the full development of the incisor roots had not been completed, very likely to cause resorption of the root ends. All I can say is that I have never had a case that had given me any trouble from that source. It is true that the adjustments must be made with extreme care and not oftener than every four weeks.

The treatment should be carried on only to the point where the radiographs show that the apical ends of the lateral incisor roots have moved labially to the crown of the cuspids; then held in a passive state for several months, and then released.

RECORD KEEPING OF SHEDDING OF DECIDUOUS TEETH AND ERUPTION OF PERMANENT TEETH

ASA J. LAGROW, D.D.S., OAK PARK, ILL.

FOR more than a year I have been keeping a record of the shedding of deciduous teeth and the eruption of permanent teeth in a group of about forty patients varying in age from three and one-half years to eight years. This group is being kept under observation. The record keeping of these items is done on a special card. The date of birth is written after the patient's name, and the age of the patient in months is recorded for each shedding and eruption. The progress of the eruption is also noted, that is, the age in months when the tooth first appears through the gum is noted, and then again when it is one-third erupted, one-half erupted, three-fourths erupted, and fully erupted. Of course this is in addition to x-ray records, plaster casts, and history. This was suggested by Dr. Samuel J. Lewis. Although I see these patients periodically, about every three months, they are requested to come in when a tooth is shed or erupted. Patients are glad to cooperate in this endeavor. A clearer view and a more intimate knowledge of the growth and maturation periods of the individual patient are gained. In those cases in which one or more deciduous cuspids are lost prematurely, as the eruption of the permanent lateral incisor occurs, one has a better opportunity to observe these cases more closely when this record is kept. However, in these cases one cannot wait until the lateral incisor appears through the gum. X-ray examination of this area every month is indicated in some cases. If there is no intercuspid growth occurring, very gentle mechanical stimulation is indicated for a few weeks. In many cases premature loss of the deciduous cuspids can be prevented.

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SOLDERING CHROME ALLOY

T. W. Sorrels, D.D.S., Oklahoma City, Okla.

THE main objective of this clinic is to focus attention on the fact that materials are now being manufactured for orthodontic purposes in the stainless chrome alloy group which fulfill all the principal requirements. There is no longer any necessity to resort to a complete change in the soldering technic in which all orthodontists are especially proficient to that of spot welding, in order to gain the advantages of these materials.

In the earlier experimental stages of the stainless steel alloys, it was found that the so-called standard 18-8 material most nearly met the orthodontic requirements as a substitute for the noble metal alloys in common use at that time. It must be taken into account that the evolution taking place in the scientific field of metallurgy is amazing. This is particularly noteworthy in the chrome alloy family of metals. By reviewing the book published by the American Institute of Metallurgy, in which a listing is made of the different manufacturers and their products, a large variety of chrome alloys will be found. The material used in the demonstration is not classified as a stainless steel, as the iron content of the alloy is below the rating given steel products. In the past, nearly all the chrome alloys offered to the profession were truly stainless steel because of their higher quantity of iron or steel. These carbonize so rapidly when subjected to heat in the soldering process that it is generally conceded to be an unsatisfactory method of uniting the different segments for the construction of appliances. It is for this reason that spot welding became so popular. In my opinion the spot welding machines will soon find a resting place on the shelves of the users, for a return to the easier method and wider range offered by soldering, as the virtues of the different chrome alloys and the newer precious metal alloys become better known. The old "bugbears" encountered in soldering stainless steel alloys are almost wholly eliminated in the use of the better quality chrome alloy.

The materials used in the demonstration were brought to my attention in November, 1933, by Dr. J. J. Guerrero, of Chicago; and my partner in practice and I have used it extensively, with complete satisfaction, in the daily routine of practice for more than two and one-half years. Several of the more conventional types of appliances were shown, which had been in use from one to two years. They illustrated the stability, flexibility and durability of the material and soldered joints. The low-fusing hard solder, with a melting point of 1325°, shows slight disintegration from abrasion and electrolytic influences over a long term. An electrokinetic study of the different combinations of materials commonly used in orthodontic practice reveals some interesting facts. Several specimens were tested in a buffer solution (known

Clinic presented at the Thirty-Fourth Annual Meeting of the American Society of Orthodontists, St. Louis, April 20-23, 1936.

as artificial saliva) with a Weston D. C. Model 322 microammeter by Drs. Sherrill and Jack Caughron to determine the relative amount of current generated by the combination of the different commonly used dental and orthodontia alloys. These tests are reported as follows:

No. 1 Specimen—Chrome alloy—Hard silver solder with precious alloy auxiliaries.

7.2 alkaline buffer solution saliva.

No. 1	opposite clasp wire and gold solder	24 M. A.
" " "	plain clasp wire	10 M. A.
" " "	18 K. gold solder	40 M. A.
" " "	gold bridge	40 M. A.
" " "	new low grade precious metal alloy	70 M. A.
" " "	silver alloy fillings	12-20 M. A.
" " "	No. 2 Specimen	18 M. A.
" " "	No. 3 Specimen	4 M. A.

7.0 neutral.

No. 1	opposite clasp wire and gold solder	8 M. A.
" " "	plain clasp wire	Neg.
" " "	18 K. gold solder	6 M. A.
" " "	gold bridge	18 M. A.
" " "	new low grade precious metal alloy	40 M. A.
" " "	silver alloy fillings	40 M. A.
" " "	No. 2 Specimen	6 M. A.
" " "	No. 3 Specimen	10 M. A.

5.8 acid saliva.

No. 1	opposite clasp wire and gold solder	4 M. A.
" " "	plain clasp wire	Neg.
" " "	18 K. gold solder	12 M. A.
" " "	gold bridge	20 M. A.
" " "	new low grade precious metal alloy	34 M. A.
" " "	silver alloy fillings	34 M. A.
" " "	No. 2 Specimen	6 M. A.
" " "	No. 3 Specimen	10 M. A.

No. 2 Specimen—All high-grade precious metal appliance.

7.2 alkaline buffer solution.

No. 2	opposite clasp wire and gold solder	2 M. A.
" " "	plain clasp wire	¼ M. A.
" " "	18 K. gold solder	½ M. A.
" " "	gold bridge	10 M. A.
" " "	new low grade precious metal alloy	10-12 M. A.
" " "	silver alloy fillings	30 M. A.
" " "	No. 1 Specimen	12 M. A.
" " "	No. 3 Specimen	12-16 M. A.

7.0 neutral.

No. 2	opposite clasp wire and gold solder	4 M. A.
" " "	plain clasp wire	Neg.
" " "	18 K. gold solder	Neg.
" " "	gold bridge	4 M. A.
" " "	new low grade precious metal alloy	20 M. A.
" " "	silver alloy fillings	44 M. A.
" " "	No. 1 Specimen	6 M. A.
" " "	No. 3 Specimen	12 M. A.

5.8 acid buffer solution.

No. 2	opposite clasp wire and gold solder	4- 6 M. A.
" " "	plain clasp wire	½ M. A.
" " "	18 K. gold solder	½ M. A.
" " "	gold bridge	6 M. A.
" " "	new low grade precious metal alloy	18 M. A.
" " "	silver alloy fillings	50 M. A.
" " "	No. 1 Specimen	8-10 M. A.
" " "	No. 3 Specimen	10 M. A.

No. 3 Specimen—All chrome alloy appliance with hard solder used in demonstration.

7.2 alkaline buffer solution.

No. 3	opposite clasp wire and gold solder	10-20 M. A.
" " "	plain clasp wire	4 M. A.
" " "	18 K. gold solder	12 M. A.
" " "	gold bridge	38 M. A.
" " "	low grade precious metal alloy	90 M. A.
" " "	silver alloy fillings	20 M. A.
" " "	No. 1 Specimen	18 M. A.
" " "	No. 2 Specimen	12-16 M. A.

7.0 neutral.

No. 3	opposite clasp wire and gold solder	18 M. A.
" " "	plain clasp wire	Neg.
" " "	18 K. gold solder	8 M. A.
" " "	gold bridge	13 M. A.
" " "	new low grade precious metal alloy	48 M. A.
" " "	silver alloy fillings	30 M. A.
" " "	No. 1 Specimen	10 M. A.
" " "	No. 2 Specimen	12 M. A.

5.8 acid buffer solution.

No. 3	opposite clasp wire and gold solder	20 M. A.
" " "	plain clasp wire	2- 4 M. A.
" " "	18 K. gold solder	6- 8 M. A.
" " "	gold bridge	40 M. A.
" " "	new low grade precious metal alloy	60-80 M. A.
" " "	silver alloy fillings	42 M. A.
" " "	No. 1 Specimen	8 M. A.
" " "	No. 2 Specimen	10 M. A.

No. 4 Single Specimen—18 parts chromium, 8 parts silver (stainless steel).

7.2 alkaline buffer solution.

No. 4 opposite	clasp wire and gold solder	3- 4 M. A.
" " "	plain clasp wire	Neg.
" " "	18 K. gold solder	4- 6 M. A.
" " "	gold bridge	8-10 M. A.
" " "	new low grade precious metal alloy	12 M. A.
" " "	silver alloy fillings	12 M. A.

7.0 neutral buffer solution.

No. 4 opposite	clasp wire and gold solder	Neg.
" " "	plain clasp wire	Neg.
" " "	18 K. gold solder	2 M. A.
" " "	gold bridge	4 M. A.
" " "	new low grade precious metal alloy	28 M. A.
" " "	silver alloy fillings	40 M. A.

5.8 acid buffer solution.

No. 4 opposite	clasp wire and gold solder	Neg.
" " "	plain clasp wire	Neg.
" " "	18 K. gold solder	Neg.
" " "	gold bridge	4 M. A.
" " "	new low grade precious metal alloy	22 M. A.
" " "	silver alloy fillings	40 M. A.

No. 5 Single Specimen—New, low priced precious alloy band material.

7.2 alkaline buffer solution.

No. 5 opposite	clasp wire and gold solder	8-10 M. A.
" " "	clasp wire	Neg.
" " "	18 K. gold solder	Neg.
" " "	gold bridge	10 M. A.
" " "	new low grade precious metal alloy	10 M. A.
" " "	silver alloy fillings	40 M. A.

7.0 neutral buffer solution.

No. 5 opposite	clasp wire and gold solder	4 M. A.
" " "	clasp wire	Neg.
" " "	18 K. gold solder	Neg.
" " "	gold bridge	6 M. A.
" " "	new low grade precious metal alloy	20 M. A.
" " "	silver alloy fillings	36 M. A.

5.8 acid buffer solution.

No. 5 opposite	clasp wire and gold solder	2- 4 M. A.
" " "	clasp wire	Neg.
" " "	18 K. gold solder	Neg.
" " "	gold bridge	6- 8 M. A.
" " "	new low grade precious metal alloy	14 M. A.
" " "	silver alloy fillings	34 M. A.

(Numbers 4 and 5 were not tested against numbers 1, 2 and 3 appliances.)

It is the opinion of Dr. E. S. Lain, Dermatologist, and Drs. Sherrill and Jack Caughron, of Oklahoma City, that so long as the electrolytic forces between metals in the mouth do not exceed 6 to 8 microammeters in normal individuals there is little danger of any pathologic disturbance being created. These men rank among the leading research workers in the United States on the electrical phenomena of metals in dentistry.

A painstaking study of this statistical information from a comparative viewpoint will be found both interesting and enlightening. It is fundamental that in every mouth in which there have been placed two or more restorative metals, electrochemically dissimilar, there has been constituted a galvanic battery which serves as a possible irritant. I should like to point out that alloys belonging to the chrome alloy and stainless steel alloy groups are as safe to use in the mouth, from a pathologic aspect, as the high grade precious metal alloys. These experiments have revealed that chrome metal compounds show less electrical ionization than gold combinations under similar association with other metallic alloys. There is, however, always a potential danger in the association of metallic substances with a wide relationship in the standard electromotive series of metals. It is, however, apparent that when amalgam fillings are present and either the precious metal or the chrome alloys are used, there is real danger of setting up inflammatory processes by these electrical phenomena. It would therefore seem feasible to request the insertion of oxyphosphate cement, synthetic porcelain cement or even gold fillings in preference to amalgam during orthodontic treatment. You should observe that both the chrome alloy group and the low grade precious metal group rank low in their electrochemical potentiality. In order to keep this factor to the minimum it is advisable to restrict the use of alloys in the mouth to those having the same proximity of electromotive force. In this connection, spot welding offers a distinct advantage over the soldering technic, as the welding process does not add a new alloy. Any advantages gained in this direction seem almost wholly nullified by the presence of amalgam fillings in the mouths of orthodontia patients. A closer observance of these working principles should, however, materially reduce inflammatory conditions of the mucous membrane and lessen the tendency toward the electrolytic disintegration of soldered joints.

Tensile strength of this stainless chrome alloy averages 140,000 lb. per square inch; Brinnell hardness, 293; melting point, about 2,580° F.; specific gravity, 8.35. This material is tougher and more resilient than precious metal alloys. It retains platinum luster in the mouth and has been tested over a period of four years. It solders readily to alloy of like kind and in combination with gold platinum alloys. It can even be used successfully in combination with stainless steel to gain the advantage of the stainless steel auxiliaries in the form of different types of brackets, which are now on the market. No expensive equipment for welding or any new technic need be mastered to use this stainless chrome alloy. The metal resists alkaline solutions and the common minor acids, except hydrochloric acid. One inch of 18 gauge wire required 260 hours in C.P. hydrochloric acid to become com-

pletely dissolved. Once soldered with the hard chrome alloy solders, it remains soldered indefinitely. A 90 per cent saving may be made on each orthodontic appliance by this wire and band material.

Soldering.—Use the material in its natural state without annealing or tempering. Almost any of the chrome alloy fluxes may be used; naturally some work better than others. Keep the flux jar covered and add water as necessary, preferably distilled water. The soldering operation is best done by using a small orthodontia gas blowpipe flame and the minimum amount of heat to allow the solder to flow freely. Use an excess of flux so that a form of glass covering is left over the soldered area. The solder flows just above the liquidation point of the flux. Immediately upon the congealing of the solder, plunge the joint while hot into a weak acid pickling solution. This both cleanses and tempers the material. Neutralize the acid in an alkaline solution of soda water, and continue any and all soldering that may be indicated by repeating the process. If by any chance a glass covering remains after the dipping, it should be broken off the joint with pliers if you wish to repeat the soldering to change position of any section to meet requirements better.

A highly satisfactory pickling solution formula is: nitric acid, drams 4; sulphuric acid, ounces 2; and water of sufficient quantity to make 12 ounces of solution. This may be weakened with water if desired. Appliances may be pickled for cleansing and polishing by immersing in the acid solution and quickly bringing it to the boiling point.

The finishing and polishing may be done with fine grip stone, sandpaper disks. Any ordinary tooth powder mixed with powdered pumice stone makes a good polishing agent to use on small brush wheels. For a high polish, the brick chrome polish should be used on a chamois wheel.

For auxiliary springs it is advisable to use a slightly heavier wire than ordinarily used in precious metal; 0.022 is the gauge recommended.

For lingual base wires, the "Ideal Wire" is advocated. The material is softer and more easily adapted. It becomes self-tempered during fabrication by heating, polishing and general manipulation. It also age-hardens during usage. The "Ideal Wire," in gauges 0.040, 0.038 and 0.036, is recommended for labial and lingual base wires. The hard spring wire is recommended for all other purposes. The spring wire may also be used for base wires if greater rigidity is desired.

All appliances may be reduced to a passive state by holding parts in position and heating to a red heat with the orthodontia blowpipe and by air cooling, following the same technic commonly used for precious metal alloys. To anneal the wire it should be heated to a bright red heat and plunged into water or the soda bath.

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MODELLING COMPOUND IMPRESSIONS WITH IMPROVED HEATER

W. J. Furie, D.D.S., Long Beach, Calif.

STRANGE as it seems, very often the things we do the most appear flawless, and little thought is given to changing the accepted technic. I believe most of us agree that the plaster impression of the gay nineties (with its many broken pieces) for study models in either dentistry or orthodontia has passed with the horse and buggy. If you still feel that plaster of Paris is necessary for impressions, you are entitled to your honest opinion, but I believe you are curable. As long as you continue to use plaster in the mouths of your defenseless patients, you owe it to them to show your sincerity by filling your own mouth with plaster, allowing it to harden, then breaking it out. This treatment once a month is severe and I believe you will be cured at the end of two or not over three months.

The secret of good impressions is to have good material in water at the proper temperature to insure good working consistency. If the temperature of the water varies one way or the other, the impression may lose its detail sharpness.

Let us give impression material some serious thought. The manufacturers have gone to great pains and expense to perfect their product and have succeeded in producing a high quality material capable of giving accurate detail. To obtain satisfactory results it is necessary to have first good materials and equipment and, second, a definite impression technic.

I shall assume that you are using material satisfactory to you, but require accurate temperature of water to obtain the proper working consistency. To have the plastic flow like molasses, for one impression, then to have it as tough as rubber for the next impression, does not give satisfactory results. The manufacturers of impression material specify the temperature necessary for the best possible results with their material, and these temperatures vary from 125° F. to boiling.

To obtain good impressions, select the material you like, learn to handle it by knowing the best working consistency, then use a heater that will maintain this temperature constantly. You will find that the time saved with accurate impressions and the reduction in the number of makeovers will soon pay for the finest heater you can buy. Experiencing the thrill of doing a job consistently well is a great satisfaction. Laboratory men claim that 90 per cent of all makeovers are due to faulty impressions by the dentist. Eliminating the laboratory expense of makeovers, as well as the time saved, is truly an economy.

Clinic presented at the Thirty-Fourth Annual Meeting of the American Society of Orthodontists, St. Louis, April 20-23, 1936.

As I have been using plastic impression materials exclusively for over fifteen years, I offer the technic I use. There is nothing new about it; yet there is far too little written about impression taking. We all have to go through the same evolutionary stages and finally, after ten or fifteen years of torturing the mind and body with uncertainties, struggling through the failures we have all experienced, we find it is the simplest method and hesitate to admit that we have ever used any other.

We take two different types of impressions: first, for full mouth study models; second, for working models with bands in position. Fig. 1 shows full mouth impressions for study models of either dentist or orthodontist. The tray is first fitted to the mouth, then well filled with impression material. In order to avoid the excess usually forced out on the soft palate, I roll the

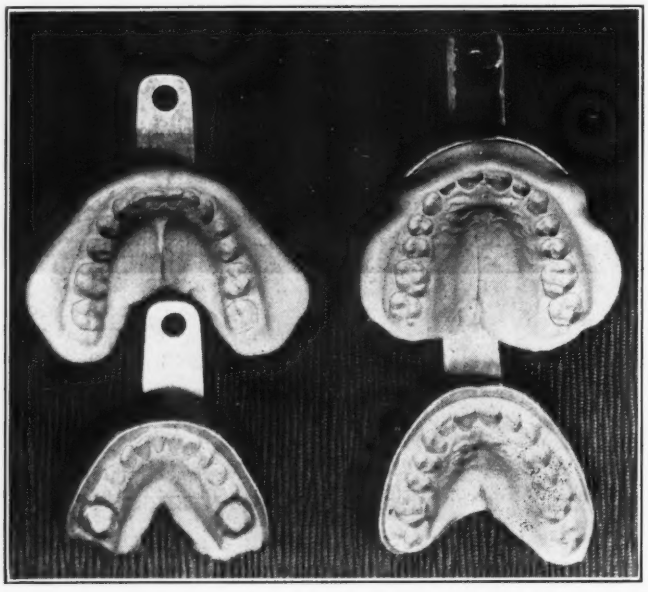

Fig. 1.—Top row of trays shows full maxillary and mandibular impressions taken with bite closed. Lower row of trays shows impressions for working models, using a very small amount of compound.

material and place the roll in the tray around the deep part or under the teeth, leaving the center or palate without material. This is placed in the patient's mouth and the patient is told to close the teeth, forcing the material to adapt itself well to all surfaces. The patient opens his mouth; by placing the forefinger in the back of the mouth, gently force the material back under the tray. Now the patient is comfortable. Have him close his teeth firmly and hold the tray between his teeth. Both the operator's hands are free to mold the material well back into the tray, assuring sharpness, and while the material is hardening, the operator is free to adjust the gnathostat or to apply compressed air for cooling. Occasionally, due to a peculiar bite, it is necessary to place a 1½ inch piece of wooden tongue depressor between the tray and the teeth of the opposite arch, engaging bicuspids on both sides. This procedure will eliminate rocking and assure a well-seated tray.

For the mandibular arch, the tray is well filled with impression material and is forced to place by closing the teeth. For sharpness on the lingual surface, I place the forefinger on either hand, first one then the other, under the tray in the floor of the mouth and with a gentle and firm pressure, force the impression material well back up under the tray. The patient closes his teeth again, and both hands are free to compress the material at the buccal and mesial surfaces.

With the above technic I find the patient is far more comfortable, the operator enjoys the rest, and the impressions are sharper and more accurate than in any other technic I have ever used.

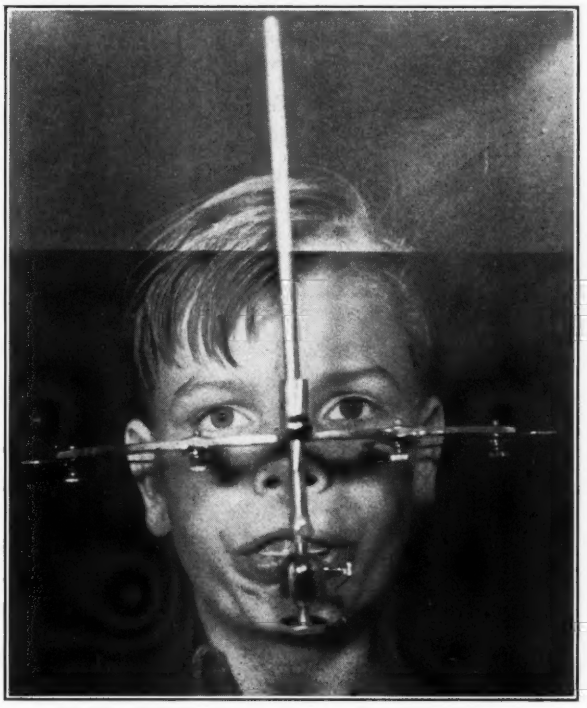

Fig. 2.—Taking impressions with closed bite. The patient is comfortable, and both of the operator's hands are free for other work.

Partial impressions for working models with bands in position for construction appliances, and impressions for making Hawley retainers require accurate impressions. I believe just such accuracy can be had if we include only the working surface of the models.

For models for constructing a lingual appliance with bands in position on teeth, use small amount of compound. Place this in the tray so as to cover only the occlusal and lingual surfaces of the teeth. The small amount of excess material will extend slightly over the gums on the lingual surface only The patient forces the tray to place by closing the teeth gently but firmly and holding them closed until the material has cooled.

Impression for Hawley Retaining Appliance.—It is necessary to get an accurate impression only of the palate, lingual and occlusal surfaces of the

teeth, and labial surfaces of the anterior teeth. With this in mind, controlling the flow of a small amount of material over these surfaces will reduce to a minimum any drawing of material that may make the impression worthless.

In conclusion, I want to emphasize the importance of a good dental compound heater for accurate work. There are several of them on the market. They not only make finer impression possible, but add enjoyment to your work and pay for themselves many times over. One of our noted educators who conducts a postgraduate course for dentists says that dentists who overlook the advantages of modern working equipment are walking over dollars to save pennies.

AN EFFICIENT SIMPLIFIED LINGUAL ARCH

CLIFFORD GLASER, D.D.S., BUFFALO, N. Y.

THE appliance described herein is one in which there has been a consolidation of base wire and auxiliary springs. The arch wire is constructed of a small gauge wire (0.025 inch) and is adapted so that it follows the gum line from molar to molar on the lingual side of the teeth. There are four

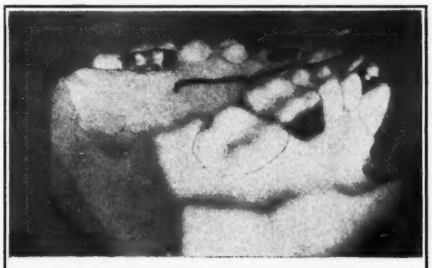

Fig. 1.

Fig. 2.

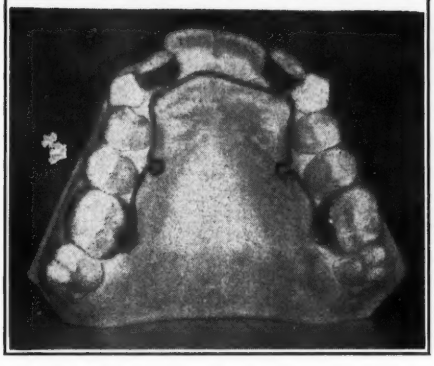

Fig. 3.

anchorage points, namely, the two first molars and the two lateral incisors or perhaps the two cuspids instead of the lateral incisors.

In the construction there are attached to the molar bands, close to the gingiva, small simplified locks which reduce the usual bulk of material necessary in locking devices. The incisor bands have small hooks attached near

Clinic presented at the Thirty-Fourth Annual Meeting of the American Society of Orthodontists, St. Louis, April 20-23, 1936.

the gingiva, and the arch wire has a loop placed between the bicuspids on each side for the purpose of spring and adjustment.

The end of the arch has a sharp reverse bend (Fig. 1) which, when inserted into the lock as shown in Fig. 2 and then the anterior part of the arch brought to the incisors, locks it in place. Then the arch is sprung under the hooks on the incisor bands. The arch in place is shown in Fig. 3.

The closeness of adaptation is very necessary for its stability, cleanliness, comfort, health of the tissues, and use of a small gauge wire.

To prevent rotation of the molars a contact of the arch wire and the molar band just anterior to the molar lock must be maintained, unless such rotation is desired.

Adjustment is made by changing the form of the arch, which is sometimes quite irregular at the beginning, to a more symmetrical form. The size of the arch is increased by opening the loops.

There is no positive fixation of the molars to interfere with their functional stimulus. Any desired lateral movement of the molars is accomplished by very little lateral spring in the appliance, but mostly by the end thrust of the arch wire.

The wire used should not be too stiff so that it may be handled easily in adjustment. It must also not be too weak so that the arch is somewhat floppy in the loop area.

To me it seems that this appliance allows more natural function of the teeth, and therefore is most efficient when myofunctional therapy is practiced with its use.

Although the photographs show a maxillary arch, it is more indicated for use on the mandible.

Except in rare instances, no spring wires are attached to this appliance. After more practice with it, the spring wires will become less and less necessary.

COMMITTEE REPORTS PRESENTED BEFORE THE AMERICAN SOCIETY OF ORTHODONTISTS AT THE THIRTY-FOURTH ANNUAL MEETING

REPORT OF COMMITTEE ON PRESIDENT'S ADDRESS

The Committee on the President's Address submits the following report.

It commends the breadth and timeliness of the treatment of the major problems that our organization and the profession at large face in this period of universal unrest and confusion.

It supports the recommendation that the Reorganization Plan be continued and further studied, and suggests that the present committee be reappointed, together with representatives from the Committee on Constitution and By-laws and the Executive Council, and submit their report in accordance with the form and order stipulated in the Constitution and By-laws for action by the Society at the next annual meeting.

It recommends that a Committee on Socio-Economics be appointed to study the problems within that field, including the consideration of devising means of counteracting the vicious propaganda relative to the extraction of first permanent molars, as set forth in the resolutions passed by this Society last year and to report at the next annual meeting.

Respectfully submitted,

OLIVER W. WHITE, Chairman,
F. A. DELABARRE,
RALPH WALDRON.

REPORT OF THE COMMITTEE ON CONSTITUTION AND BY-LAWS

In accord with Article IV, Section 11, of the Administrative By-laws of the American Society of Orthodontists, we submit the following report.

Incident to a movement already set in motion which would bring about a coordination of the American Society of Orthodontists and the several sectional societies in the United States and Canada, there would necessarily be required certain changes in our Constitution and By-laws.

As a matter of recent history, familiar to each member of this Council, a document listing many proposed changes in our Constitution and By-laws was placed in the hands of members of each sectional society.

This Committee, through correspondence, attempted to obtain expressions from each sectional society as to its wishes relating to the proposed changes in our Constitution and By-laws. A copy of a letter mailed to the secretary of each sectional society reads as follows:

October 15, 1935

Dear Dr. ——:

I am enclosing a copy of the proposed changes in the Constitution and By-laws of the American Society of Orthodontists which was presented to the Society at the recent meeting in New York.

This in turn was handed over to the Committee on Constitution and By-laws, and we shall make a report of the recommendations to the Executive Council. Because of the many changes which will be effected by the proposed change and because of the great degree to which it will affect the sectional societies, the committee feels that it should present the proposed change to the sectional societies to get their opinion, so that the committee may be guided in its actions.

I would appreciate it very much if you would present this matter before your society at your next meeting and write me any suggestions or changes that your society has to offer.

With best wishes, I am,

Yours fraternally,

(Signed) OREN A. OLIVER, Chairman.

In answer to this inquiry, only two replies were received.

In addition to the above effort to clarify the movement of coordination, members of this committee sought counsel from individual members of the American Society of Orthodontists, whose integrity and sincerity of purpose could not be questioned.

It was shown from this source that there was a diversity of opinion to such a degree as to make a definite report at this time hazardous.

To sum up what seems to be a philosophical opinion, we offer the following letter from Dr. Frank Casto, the immediate past chairman of this committee:

"In regard to the reorganization plan, I can see no course to pursue than to follow the advice of the attorney whose opinion you sought. The present controversy cannot be settled by attempting to put the plan through at the St. Louis meeting. Under the circumstances, more time for consideration on the part of the members is advisable. There is no doubt but there is merit in Dr. Waugh's idea, and the plan should not be dropped but kept alive and developed through the proper committee and officers. Inasmuch as the reorganization plan as proposed will require a fundamental change in the structure of the American Society of Orthodontists involving some legal points, either a special committee of the Society should be created or the Legislative Committee or a committee of the Executive Council acting jointly with the Constitution and By-laws Committee should be authorized to proceed along lines designated by the Society. The important point is to keep the members satisfied and to avoid any disruption in the Society. The Society passed resolution at the New York meeting approving the plan in principle; therefore this action cannot be ignored. I had hoped to attend the St. Louis meeting, but regret that I shall be unable to do so. I would suggest you and Dr. Howard have a member appointed to act in my stead during the meeting. The Constitution makes such provision. I feel certain that you men will manage the situation so that harmony will prevail and all will be happy. You may sign my name to the Committee's Annual Report, for I shall be very glad to put my stamp of approval on it."

RECOMMENDATIONS

It is now recommended by the Committee on Constitution and By-laws that no attempt be made at this session to change our present Constitution and By-laws.

It is further recommended that this Council instruct the incoming President to appoint what shall be designated as an Advisory Committee on Constitution and By-laws, and further that this newly appointed committee shall be composed of one member who shall also be a member of the American Society of Orthodontists from each of the sectional societies in the United States and Canada. The chairman shall be designated by the incoming President.

It is further recommended that the chairman of this Advisory Committee shall obtain a report upon this subject from each sectional society and submit same to the chairman of the Committee on Constitution and By-laws previous to the next annual meeting.

Respectfully submitted,

O. A. OLIVER, Chairman,
C. C. HOWARD,
F. M. CASTO.

REPORT OF THE COMMITTEE ON ORTHODONTIC EDUCATION

In 1929 at Estes Park a committee composed of Dr. B. E. Lischer, Dr. A. W. Crosby, and myself was named to make a comprehensive study of orthodontic education. To quote from the first report read at Nashville in 1930: "We believe the creation of this committee

in 1929 was for the purpose of making comprehensive inquiries into the problems of orthodontic education; and the very manner of our election (by which the new members will serve terms of five years) encourages us to plan our survey along fairly extensive lines. Our first inference was, therefore, that you did not want a superficial statement on orthodontic education, containing perhaps a few suggestions on the content of a laboratory course for example. Such a statement might easily be submitted in this, our first annual report.

"In our preliminary discussion of the plan of investigations, and of the nature of our task, we have been impressed by the complexity and number of problems comprising them. Hence, there is no attempt made in this report to arrive at any final solutions or to offer any standardized modes of educational procedure. We have no desire to squeeze orthodontic education into a perfectly finished curriculum, but we have hopes of helping to define the purpose of instruction and training in orthodontics, and to suggest improvements from time to time in the methods of teaching. We wish most to become a clearing house on orthodontic education, where all who are seeking information and help may come for the exchange of ideas. We shall try to avoid dogmatic attitudes and discourage, if need be, the erection of orthodox courses that might interfere with further experimentation in our educational process. We firmly believe that the policy of experimentation should abide permanently in all educational matters, particularly in a field as incomplete and unsatisfactory as ours. Finally, we realize that we have no authority to enforce educational standards."

The aims and purposes were clearly and concisely stated and have been followed to the best of our ability. Little did we realize then the possibilities ahead for service in this field. Who had any intimation that Dr. Lischer, then Chairman, was to become dean of the Dental School of Washington University, that Dr. Crosby was to be elected to the American Board of Orthodontia, or that the writer of this report together with Dr. Abram Hoffman were to be selected by the American Dental Schools Association to redraft the schedule of study of undergraduate orthodontic education?

These honors have not been stated in a spirit of boastfulness, but in a spirit of appreciation for the opportunity to serve in a field so vital to the future progress of orthodontia. Few realize the problems incurred in reorganizing a dental curriculum to include additional hours in any one phase of study. Disregarding many details, it involves decreases in hours of other departments; increase in personnel of the faculty; additional appropriations, sanction of the faculty of the college, and finally approval of the board of trustees of the university. It would be utterly impossible for our committee on orthodontic education to go before the various schools asking for increases in orthodontic courses and expect to get them. It could not be done, except through the above procedures. It was, therefore, extremely fortunate for us when the American Association of Dental Schools in 1934 of their own accord instigated a Survey of Dental Education. Orthodontics naturally was included and, may I say, has become a major interest, both as to the extent of the course and also as to the content of the curriculum. There seems to be little doubt of the great public need for orthodontic service. The important difference of opinion among teachers is concerned with how much, if any, of this need can be served by the general practitioner of dentistry and how much should be left entirely to specialists in orthodontics. Out of the difference of opinion on this point arises the question as to what instruction in orthodontics should be included in the undergraduate dental curriculum.

Apparently there is agreement on at least four points, as follows:

First, the specialty of orthodontics must be maintained on an even higher standard of professional knowledge and ability than has been formulated by our preceptors.

Second, the basic principle of orthodontics is growth and development. To understand this principle one must be grounded in the biological sciences. As an example, one should understand the recent developments in the knowledge of endocrine deficiences and of dietetic influences on the development of the child.

Third, orthodontics, as is surgery, is contingent on mechanical dexterity. One would not choose a surgeon solely because of his knowledge of anatomy and the allied sciences if he had no operative ability. Conversely, mechanical technic which is not based on knowl-

edge and experience does not warrant our confidence. This is especially true in the field of orthodontics. Therefore, mechanics as well as theoretical knowledge has a place in our study.

Fourth, no course, no matter how comprehensive, can fortify the graduate against all the problems which arise in the practice of orthodontics.

The schedule of study read before this society last year has been adopted by the American Association of Dental Schools. The extent to which this survey has been put to use in the various schools is best shown by replies to questionnaires sent out within the last three months to the heads of orthodontic departments of the forty-four dental schools of the United States and Canada. These questionnaires sought information regarding the ways and extent to which the sections of the Survey Report on orthodontics are being used; comments, criticism, and suggestions regarding these sections; the principal points of difference between the instruction offered and that suggested in the Survey Report; and the amount of time devoted to instruction in this field. Some information was also requested regarding graduate instruction in orthodontics.

Reports were received from 41 dental schools; the responses from these institutions are greatly appreciated. As might be expected, the reports of the various schools differ as would a cross-section of the opinion of the men who are teaching. Orthodontists are men of very definite ideas and practices. This situation has aided materially in affording an advancement such as no other specialty of dentistry has accomplished in the same brief time. No doubt a survey of our private practices would reveal the same variation in methods of operation as is found in ideas regarding teaching. It is gratifying to find successful orthodontic results in all these practices. One's own ability, his environment, his assistance, and other factors plan an important part in producing his results. If this is true in private practice, it is also true in teaching.

This report is based on the replies received from the questionnaires. An effort is made to state the facts and opinions as impartially and completely as possible and to interpret the information as that seems necessary and advisable.

CONTENT OF PRECLINICAL INSTRUCTION

The great majority of the teachers replying to the questionnaire on preclinical instruction indicated that the content of instruction in the Survey Report was acceptable. The principal suggestion made regarding this instruction was that much or all of the laboratory exercises be omitted. In general, this suggestion came from schools in which the students do little or no clinical orthodontic work. The replies indicate clearly that the great majority of the schools do not agree with this suggestion. A few teachers desired the addition of several minor items and the omission of other items.

Interesting comments regarding preclinical instruction were received from several teachers. One teacher said he could hardly see how any desirable additions could be made to the content and that very few items could be omitted, but he stated that "here and there, for purely personal reasons, one might reach a conclusion that something was unnecessary." Another teacher would include cephalometric diagnostic methods. Still another would not include the operation of appliance, since he thinks it "only complicates matters by emphasizing individual tooth movement." He states that in his instruction he is "trying to teach that the correction of malocclusions is not moving teeth into line, but is a matter of bone development by which we establish normal form, size and relation of the arches and normal occlusion of the teeth."

Several comments suggest that the preclinical instruction should give more attention to growth and development. One teacher deems it desirable "to emphasize the biologic considerations incident to orthodontics in the preclinical teaching as well as in the clinical course" and in his teaching he devotes more time to "summarizing dentofacial growth and development and tissue responses during tooth movement" in the hope "that the student will thus gain the proper appreciation of the part mechanics plays in orthodontics rather than feeling that wires and bands are the answer to all orthodontic problems."

Another teacher says the report states that the course in orthodontics appears to present the best opportunity to correlate the various subjects of the dental curriculum, particularly the biologic sciences, but he thinks that in the Survey Report "the student is given a very heavy dose of appliances, both in class and in the laboratory as an introduction to the subject of orthodontics and before he has any adequate idea of the problem," and, moreover, he feels that this "is approaching the subject from the wrong end." He suggests also that instruction in orthodontics in the report "appears to mean making and manipulating appliances," and he states that the laboratory time in his course "is devoted to plaster planning technic to develop precision, and to impression taking and model making" and that "appliances are avoided purposely so that the student may not start out by being appliance-minded and appliance-ridden."

The comments from these two teachers call for some explanation. In outlining the instruction in orthodontics the subcommittee definitely assumed that the student would have adequate instruction in anatomy, oral anatomy and oral physiology, histology and embryology, physiology, and pathology which would serve as a foundation for his study of orthodontics. It would appear that if the student pursues these subjects as outlined in the Survey Report, he will obtain a biologic basis for understanding the problems of orthodontics. If this be the case, the preclinical course in orthodontics should not attempt to reteach all the sciences; rather, it should correlate the biologic principles involved in orthodontics and teach the construction of appliances which are in accord with growth and development and accomplish the purposes of orthodontic treatment. Merely because considerable time is spent in learning to construct appliances is not sufficient reason for believing that this will give the student a distorted point of view. After all, the conception of orthodontics which the student obtains depends, to no small extent, upon the attitude and conception of the instructor.

Concerning the objectives of instruction there is obviously a variety of opinion. It would appear that the objective of instruction should be the determining factor in the laboratory teaching. If the student is later to have clinical practice in treating cases of malocclusion, he should certainly learn enough about the necessary laboratory work to enable him to do it intelligently and with facility. However, there seems to be little or no reason why he should learn to take orthodontic impressions and make orthodontic casts and appliances unless he will have the opportunity to make them later for patients.

Concerning the objectives of instruction as stated in the Survey Report, 26 schools out of the 41 replying are in definite accord; eleven schools are not giving courses in clinical orthodontics; four schools had no comments. As might be anticipated, the principal difference of opinion relates to the training of the student in the treatment of cases of malocclusion.

A number of teachers contend that it is impossible to distinguish the less complicated from the more complicated cases of malocclusion. To be sure, no one can deny that we cannot always define a simple case. Oftentimes complicated cases have simple beginnings. This, however, is not sufficient reason for classifying all cases as complicated. Many cases are not sufficiently difficult to warrant the services of a graduate specialist in orthodontics. Upon this hypothesis the subcommittee formulated the Survey Report. Unless we admit that certain cases can be treated successfully by men who complete a course of instruction such as is outlined in the Survey Report, there is no basis for undergraduate study. The situation may be illustrated with an example for surgery. A minor amputation is not classified as one of the more difficult operations. There is no assurance, however, that it may not become involved, yet the operation is being performed daily by those not qualified to do major surgery. It seems unfortunate to becloud the problem of orthodontic education by haggling over the meaning of less and more complicated cases of malocclusion.

It may be stated incidentally that the subcommittee which planned the suggested instruction in orthodontics never had in mind the preparation of a schedule of study that would be followed in all details by all the teachers. Rather, the hope was that the report might serve as a stimulant to better teaching in a field in which there is now much confusion and that it might become a basis for discussion which would result in a clarification of the issues and in a better understanding of objectives and content of undergraduate instruction.

CLASS INSTRUCTION DURING CLINICAL YEARS

It is gratifying to find the majority of schools in accord with the clinical objectives of instruction as outlined in the Survey Report. Of the eleven schools not favoring undergraduate clinical procedures, seven are teaching from 32 to 64 hours of didactic instruction. Six of the eleven schools give graduate courses. Only two schools reporting give no courses.

Three schools suggested as desirable additions that greater emphasis be placed on cephalometric and photostatic diagnosis. Five schools favor an increase in biologic phases of study. The writer feels this is amply taken care of on pages 147 and 148 under the heading of "Outline of Instruction in Oral Physiology" in the Survey Report. The didactic content of instruction seems, therefore, fairly comprehensive.

The change in the length of the dental course and the inclusion of predental education has increased the student's ability to master additional schedules of dental study. The dental graduate of today has completed practically the same courses in the fundamental and biologic sciences as has the graduate in medicine. Also the more mentally alert student has had time to investigate minor problems of research or study some of the specialized phases of dentistry.

It is possible now in many dental colleges for the advanced student in Arts-Dentistry who has grades above the average to elect in his last two years of dentistry a course in the graduate school. This course is prescribed by the graduate school of the university, and differs somewhat according to the credits of the student. By this double registration a student may elect courses granting ⅓ credit toward a graduate degree before graduation.

I can see in this an oportunity for a student to shorten his years of schooling. It affords an incentive for better work. It may be a solution for initial study of specialized courses. We should not forget that in teaching we are dealing with different personalities and mentalities which cannot be treated entirely alike.

I have never favored clinical orthodontics as a requirement of all students for graduation. Rather, I feel a student should elect clinical orthodontics if he is sufficiently interested and has the ability to qualify. All students should have at least as thorough a didactic course as outlined in the Survey. Those students not electing undergraduate clinical orthodontics should be required to observe clinical cases.

Much of the success of clinical orthodontic instruction lies in the facilities of the school, and the number and ability of the instructors. A sufficient number of demonstrators should be afforded to provide instruction to small groups of students. One of the greatest difficulties is that orthodontics has always been regarded as a minor course of study. Generally there has not been a sufficient appropriation to provide the instructional staff necessary to teach the subject successfully. The majority of the schools have to rely upon one or two part-time instructors, whose primary interests are their private practices. One cannot divide his time and do justice to both teaching and office practice. Teaching usually suffers because our interest centers in our chief means of livelihood. The increased income of schools offering graduate courses on a large scale provides money for a sufficient staff to give an intensive course. If the course of study in biologic sciences outlined in the Survey is sufficiently comprehensive upon which to base a graduate course (as many instructors have indicated it is), then the student can be given a course in clinical orthodontics during his junior and senior years, as well as the year after graduation if proper supervision is afforded.

Considerable misunderstanding seems to exist in regard to clinical time allotted. A range of 0 to 520 hours was reported. Some schools have evidently added all the time the entire staff of orthodontic teachers are giving to clinical supervision: 96 hours per year, or 3 hours per week. This is ample time for one student to carry several cases, provided he has competent instructors. What a fine thing it would be if the 55 per cent of dentists practicing part-time orthodontics had had this amount of orthodontic clinical training, and what a foundation for graduate instruction.

GRADUATE INSTRUCTION

While the Survey Committee in formulating its report made no recommendations concerning graduate orthodontics, nevertheless it is not to be construed that it does not favor graduate courses for those expecting to teach or limit their practice to orthodontics. There

seems to be a growing apprehension, however, in the minds of some teachers that undergraduate courses may detract from the graduate set-up. It is undoubtedly true that greater income can be derived from graduate courses. However, it is my opinion that if "commercialized education" is the goal rather than conservative fundamental principles of education, then this society should be the first to enter protest. The questionnaire included three questions pertaining to graduate courses.

First, is graduate orthodontics taught in your school, if so, how many students have you?

Second, in what way does your graduate course amplify the course of study in orthodontics incorporated in the Survey, "*A Course of Study in Dentistry*"?

Fifteen schools are offering graduate courses to approximately 125 students. The majority of these courses are based upon one year of full-time instruction or two years half time. All lead to master's degrees in the graduate schools of their respective universities or colleges.

This is an interesting comparison to the first questionnaire this committee sent out in 1930, in which we find only four schools giving graduate courses in orthodontics leading to advanced degrees, with only nine students in attendance. Only two degrees were conferred in 1929; 44 students were in attendance in postgraduate courses in 1930.

For those who feel that improvement in orthodontic education is too slow a process, these comparisons should prove stimulating. From conversations with many men, including teachers, I do not believe the set-up of graduate courses is thoroughly understood. The administration is more complex than postgraduate courses, yet they are continually confused. I recommend that the committee next year make a survey and report on graduate orthodontia, as conducted by the graduate school of the university which is either accredited by or affiliated with the American Universities Association.

In answer to the question, "In what way does your graduate course amplify the Survey Report?" various answers were received. All agreed that their courses offered more intensive theoretical and clinical courses than the Survey schedule of study. Five schools especially intensify the biologic courses. Four schools require a thesis. One school requires an original problem in research. Another varies the course to meet the need of the student.

I believe absolutely in the need of graduate courses for those limiting their practices to orthodontics. The specialist cannot, however, take care of the immense amount of work. Dentistry, as well as medicine, is fearful of socialization. Let us provide a program of service to the less fortunate, rather than have it forced upon us by those who do not understand and appreciate our problems.

A tabulation of the data in the questionnaires received from 41 dental schools of the United States and Canada is as follows:

PRECLINICAL

Number of schools reporting	41 schools
Number of schools not reporting	3 schools
Range of hours of didactic teaching	0- 44 hours
Average	26 hours
12 schools are teaching 32 hours or more	
7 schools are not teaching preclinical orthodontics	
Range of hours of *laboratory* instruction	0-150 hours
Average	48 hours
11 schools are instructing 48 hours or more	
7 schools are not giving preclinical laboratory courses	

EXTENT TO WHICH THE SURVEY REPORT IS BEING FOLLOWED

Fairly close	22 schools
No course or widely at variance	11 schools
Courses being revised to conform	4 schools
Used as outline or for staff discussion	2 schools
No answer	4 schools

COMMENTS, CRITICISMS AND SUGGESTIONS

Objective of instruction	
Good	24 schools
At variance	11 schools
No answer	6 schools
Desirable additions to the Survey Report	
None	18 schools
Minor changes	11 schools
No answer	12 schools
Suggested omissions for the Survey Report	
None	13 schools
Suggested omissions	11 schools
No answer	17 schools
Time allotted	
Satisfactory	13 schools
Too much	3 schools
Not enough	9 schools
No answer	11 schools
Unsatisfactory division of time	5 schools

This question was confused. Some answered it with reference to the time allotted in the Survey Report. Others interpreted it to mean the hours their school was spending in orthodontic education.

PRINCIPAL POINT OF DIFFERENCE

In agreement	14 schools
In agreement but insufficient time in schedule	1 school
Not taught	11 schools
More didactic, less laboratory	5 schools
Course taught as an elective	1 school
No answer	3 schools
Distribution of class hours	5 schools
Basic principles taught only	1 school

CLINICAL

Number of schools reporting	41 schools
No replies	3 schools
Range of hours of didactic teaching	0-138 hours
Average	41 hours
20 schools are teaching 32 hours	
8 schools are teaching 64 or more hours	
Range of clinical hours	0-520 hours

NOTE.—The range of hours of clinical practice is confused. Some schools give the total hours that the orthodontic clinic is open for all students. The clinical hours should be based upon the hours the individual student has available in his dental schedule. As example, this might mean 3 hours per week or 96 hours per year.

EXTENT TO WHICH THE SURVEY REPORT IS BEING FOLLOWED

Similar to Survey Report	25 schools
No course	10 schools
Not being followed, but satisfactory	6 schools
Objective of instruction	
Satisfactory	26 schools
No course	11 schools
Overemphasis on appliances	1 school
No answer	3 schools

Desirable additions to the Survey Report

None	18 schools
No answers	8 schools
Increase in biologic sciences	2 schools
Survey has wrong approach	2 schools
Cephalometric and photostatic diagnosis	3 schools
Survey not followed	6 schools

Suggested ommission from the Survey Report

None	18 schools
Clinical practice	11 schools
Less time to appliances	1 school
Photography	1 school
No answers	10 schools

Clinical practice

By the student	12 schools
By demonstrator and student	4 schools
Students observe	14 schools
No orthodontics	11 schools

NOTE.—In some of the schools having no undergraduate clinical orthodontics, students observe cases carried in the graduate school clinic.

Time allotted

Satisfactory	16 schools
More time	8 schools
Too much	11 schools
No answer	6 schools

NOTE.—Again there is confusion in the minds of those answering the questionnaire. Some men referred to the amount of time orthodontics was taught in their school. The intent of the question was, "Is the time allotted in the Survey Report satisfactory?"

PRINCIPAL POINT OF DIFFERENCE

Very little difference	13 schools
No clinical orthodontics	11 schools
Appliances and work by demonstrators	6 schools
Difference in time allotted	2 schools
More time to clinical orthodontics	2 schools
More time to didactic teaching	2 schools
No answer	2 schools
Course taught as an elective	1 school
Course being reorganized	2 schools

COMPARISON OF ORTHODONTICS WITH OTHER SPECIALIZED SUBJECTS

As comprehensive	24 schools
Not as comprehensive	8 schools
Matter of opinion	1 school
No answers	8 schools

IS GRADUATE ORTHODONTICS BEING TAUGHT?

Yes	15 schools
No	27 schools
Varies	1 school

An approximate total estimate of graduate students is 100. Of the three schools not reporting two have graduate orthodontic courses. The total graduate orthodontic enrollment might be conservatively estimated at 125 students.

The question, "In what way does your graduate course amplify the Survey Report?" was not answered very satisfactorily.

Two schools reported additional study in biologic sciences and required thesis.

One school reported it spends more time in graduate clinical demonstration.

One school reported the course varied to meet the needs of the individual student.

Five schools did not answer this question.

EARL G. JONES, Chairman,
B. E. LISCHER,
FREDERIC T. MURLLESS, JR.

REPORT OF PUBLICATIONS COMMITTEE

The Publications Committee has pleasure in submitting the following report.

Due to the fact that the Publications Committee has been an inactive committee it has been difficult to determine its proper function and up to the present time the members of the committee have not been sure of their ground. True, the duties are definitely outlined in the By-laws, but heretofore the By-laws have not been adhered to in all respects.

We believe that all members of the Society appreciate the fact that it is desirable to have the proceedings in the hands of the members at the earliest possible date, but it has seemed impossible to accomplish this in the past because papers read before the Society have not been turned in promptly. The publication of the bound volume of last year's proceedings has been delayed because two of last year's essayists have as yet failed to turn in their papers.

Your Committee believes that in future as soon as the Chairman of the Program Committee is appointed, the Chairman of the Publications Committee provide him with printed instructions to forward when the invitations are given to the essayists and clinicians, advising them to have their papers, case reports and reports of clinics, prepared in duplicate with illustrations, one copy to be forwarded to the Chairman of the Program Committee at least two weeks before the annual meeting, the other copy to be retained by the essayist to be read at the meeting. Upon delivery of such paper to the Chairman of the Program Committee, it then becomes the property of the Publications Committee. This would not only facilitate the work of the Chairman of the Program Committee in gathering together the papers, but would also be extremely valuable in the preparation of newspaper publicity.

We also recommend that the Secretary provide the Publications Committee with a copy of the transcribed notes of the business sessions from which a condensed report may be made for the proceedings. A copy of the detailed transcribed notes must, of course, be kept on file by the Secretary to be available to anyone requesting more details regarding the business sessions of the Society.

We recommend further that, if at all possible, this year's Committee publish the proceedings of this meeting within three months from date and request the essayist and clinicians to cooperate with the Chairman of the Program Committee, by turning over to him immediately, a copy of the papers read at this meeting.

In order to accomplish this, any paper being delayed beyond a period of two weeks will appear only by title, with the notation that it was not turned in.

The Publications Committee therefore offers the following recommendations:

1. That the Publications Committee become an active committee.
2. That its duties be carried out in accordance with the By-laws.
3. That the Chairman of the Committee communicate with the Program Committee on procedure, as outlined above.
4. That, if at all possible, the proceedings of this meeting be published within ninety days.

Respectfully submitted,

G. VERNON FISK, Chairman,
CLAUDE R. WOOD,
O. W. BRANDHORST,
BROOKS BELL.

REPORT OF NECROLOGY COMMITTEE

The Necrology Committee submits the following report covering resolutions on the deaths of three of our members: Dr. E. E. Moore, Fort Worth, Texas, died March 15, 1934; Dr. John Lewis Walker, Sr., Norfolk, Virginia, died September 6, 1935; and Dr. Albert H. Ketcham, Denver, Colorado, died December 7, 1935.

Dr. Robison has submitted the following verse which seems to be very appropriate.

"I cannot say, and will not say
That he is dead. He is just away!
With a cheery smile and a wave of the hand,
He has wandered into an unknown land,
And left us dreaming how very fair
It needs must be, since he lingers there.
And you—Oh, you, who the wildest yearn
For the old-time step and the glad return
Think of him faring on, as dear
In the love of There as the love of Here.
Think of him still as the same, I say
He is not dead—he is just away."

May the spirit of our members who have passed on remain with us encouraging and stimulating us to labor for further advancement.

Respectfully submitted,

HENRY F. HOFFMAN, Chairman,
H. C. FERRIS,
HOMER B. ROBISON.

E. E. Moore

E. E. Moore of Fort Worth, Texas, died March 15, 1934.

Dr. Moore was born in Windsor, Georgia, May 28, 1878. After being graduated from Washington University in 1903, he engaged in dental practice in Italy, Texas, until 1905 when he moved to Fort Worth. In 1917 he limited his practice to orthodontia, in which he continued until his death.

WHEREAS, in the death of Dr. Moore this Society has lost a valued and faithful member, therefore be it

Resolved, That this resolution become a part of the minutes of the Society.

John Lewis Walker, Sr.

John Lewis Walker, Sr., of Norfolk, Virginia, died September 6, 1935.

Dr. Walker was born on the plantation of his father "Rose Hill," near Boydton, Virginia, March 1, 1856. Following the Civil War the family moved to Lunenburg County, Virginia, where he spent his boyhood on a farm and received his early education in private schools. In 1882 he went to Texas where he was employed by the Texas Express Company and the Wells Fargo Express Company. Returning home in 1890, he attended a spring course of lectures at the Chicago College of Dental Surgery. That fall he entered the Baltimore College of Dental Surgery, attending one session, after which for lack of funds to continue his studies he returned to Texas and opened a dental office in the town of Timson, making trips to outlying localities on horseback carrying his instruments and equipment in saddlebags.

Dr. Walker practiced in Texas about three years. He was appointed a member of the Texas Board of Dental Examiners but did not serve on the Board, as he returned in the fall of 1894 to complete his dental course at the Baltimore College of Dental Surgery from which he was graduated with the degree of D.D.S. on March 21, 1895.

Following his graduation he engaged in general practice at Norfolk, Virginia, until 1913 when he attended the Dewey School of Orthodontia and limited his practice to orthodontia, in which he was engaged at the time of his death.

In 1897 he married Mary Chappel Bagley. He is survived by his wife, three daughters, two sons, six grandchildren, three sisters, and three brothers.

The career of Dr. Walker, a long and eventful one, indicates the indomitable spirit for advancement which animated him.

WHEREAS, in the death of Dr. Walker this Society has lost a valuable and loyal member, therefore be it

Resolved, That this resolution become a part of the minutes of the Society.

Albert H. Ketcham

The profession suffered an irreparable loss in the death of Albert H. Ketcham December 7, 1935. Although those who knew him best felt that he was only in the prime of his accomplishments, still the history of his life reveals that his had been a much more varied and eventful career than is the lot of most men.

Dr. Ketcham was born on a farm in Vermont August 3, 1870. When he was eighteen, he entered the Vermont Military Academy, chopping wood to help earn his way. Respect for his mother's brother, Dr. W. H. Wright of Brandon, Vermont, was responsible for his interest in dentistry. After spending a year in Dr. Wright's office, he entered the Boston Dental College, from which he received the degree of D.D.S. in 1892. Following his graduation, he was given the position of clinical instructor in Operative Dentistry at the College, which, with private practice, occupied him until the fall of 1895 when illness compelled him to retire, going first to the Adirondacs in New York and later to Colorado Springs, Colorado.

He again entered general practice at Aspen, Colorado, in January, 1897, moving in July of that year to Meeker, Colorado. That fall he took a position in the Infirmary of the University of Denver, Dental Department, entering general practice the next year in addition to carrying on his college work as instructor in crown and bridge, and orthodontia.

Soon after this, Dr. Edward H. Angle was the guest of the Colorado State Dental Association at its annual convention, and from him Dr. Ketcham received the inspiration to specialize in orthodontia, attending the Angle School of Orthodontia in 1902.

His success in orthodontia was most phenomenal. Not only did he establish for himself a reputation for skill, thoroughness, and deep interest in his patients, but he was a pioneer in every movement for the improvement and advancement of the specialty of orthodontia, giving his time and energy unstintingly to this end.

Dr. Ketcham was a member of the Delta Sigma Delta, the Rotary Club of Denver, the Chamber of Commerce, the Denver Athletic Club, the Lake Edith Club, and the Bear River Duck Club of Utah. He was a member of the Denver Dental Association of which he had served as secretary, the Colorado State Dental Association, the American Dental Association, the American Society of Orthodontists of which he was a past president, and the Rocky Mountain Society of Orthodontists of which he was the first president. In 1930 he received the degree of Fellow of the American College of Dentists.

At the time of his death, he was president of the American Board of Orthodontia, in the organization of which he was largely instrumental, and vitally interested in its welfare and future.

He was also an honorary member of the Pacific Coast Society of Orthodontists, the Southwestern Society of Orthodontists, and the Southern Society of Orthodontists.

Dr. Ketcham is survived by his wife, his mother, a daughter, Miss May Ketcham, a son, Dr. Arthur C. Ketcham, and a grandson, Arthur B. Ketcham, all of Denver.

In respect for his memory and the obligations we owe him we offer this resolution:

WHEREAS, this Society has lost one of its most valued members, an untiring worker for the advancement of the science of orthodontia, and a friend to all who knew him, be it therefore

Resolved, That this resolution become a part of the minutes of the Society.

Ralph P. Howarth

Dr. Howarth was born December 20, 1898, in Cleveland, and died March 26, 1936, at St. Lukes Hospital after an illness of six days.

He attended the Cleveland Public Schools and after being graduated from West High School he enrolled at Western Reserve University Dental School, graduating in the class of 1921.

During his college days he joined Pi Kappa Alpha, a social fraternity, and it was not until after his graduation that he was initiated into the Supreme Chapter of Delta Sigma Delta.

Dr. Howarth was a member of the American Dental Society, the Ohio State and the Cleveland Dental Societies, the Northern Ohio Dental Society, the American Society of Orthodontists, and the Great Lakes Society of Orthodontists, in which society he recently served as secretary.

He was past president of the Western Reserve University Dental Alumni Association, and last year was made a member of the honorary dental fraternity Omricon Kappa Upsilon. He was also a member of the Hermit Club.

Dr. Howarth is survived by his wife, Esther Wells Howarth; two daughters, Susan and Janet; two sons, Robert and Ralph, Jr.; his father, John R. Howarth; his mother, Ada Howarth; three sisters and one brother.

Dr. Howarth's greatest interest in life centered around his family and his profession. He enjoyed the beauty and quiet of his country place at Aurora and had planned great things for his family there in the future. He was continually striving to better himself in his chosen specialty and last year completed the course at the Strang Post Graduate School of Orthodontia.

Aside from his mechanical ability he was endowed with fine artistic qualities, having attended classes in painting and sculpturing at the Cleveland School of Art. The whole-hearted manner in which he gave of himself to his profession, friends and associates endears him to us as a real fellow.

Let us here record and express our sympathy for the loss sustained by his family and friends, by inscribing these sentiments in our minutes where they may serve as an inspiration to those who follow.

Louis Prentiss Bethel

WHEREAS, in the death of Dr. Louis Prentiss Bethel, January 17, 1936, the American Society of Orthodontists has suffered the loss of one of its pioneer members and his family a devoted husband and father; and,

WHEREAS, Dr. Bethel contributed to the progress of dentistry as a general practitioner, a specialist of orthodontics, a teacher, a dean, a member of the State Board of Dental Examiners, and editor of the *Dental Summary;* and also filled many important official positions in various dental organizations; therefore be it

Resolved, That the American Society of Orthodontists, in regular session April 22, 1936, expresses its appreciation for Dr. Bethel's fellowship and influence in behalf of professional advancement; and, be it further

Resolved, That these resolutions be incorporated in our official minutes and that copies be sent to the INTERNATIONAL JOURNAL OF ORTHODONTIA and to the bereaved family.

REPORT OF THE AUDITING COMMITTEE

The Auditing Committee begs to report that it has examined the public accountant's report and checked it with the books of the secretary-treasurer for the year 1935.

Records are correct, and we wish to commend the public accountant and our secretary-treasurer for the brief but complete report and the manner in which records are kept.

Respectfully submitted,

OLIVER W. WHITE, Chairman,
G. VERNON FISK,
PAUL SPENCER.

REPORT OF THE AMERICAN BOARD OF ORTHODONTIA

The American Board of Orthodontia is pleased to report that twenty-two certificates were used at the 1935 meeting, making a total of one hundred and two orthodontists who have successfully fulfilled the requirements of the Board. Additional certificates are being awarded during the present meeting, and the Board is very gratified by the earnestness and by the spirit of cooperation that are invariably expressed by candidates for examination.

To commemorate the splendid achievements of our late president, Dr. Albert H. Ketcham, and to serve as an inspiration to the advancement of Orthodontia, the American Board of Orthodontia has created the Albert H. Ketcham Memorial.

The material symbol of this Memorial shall consist of an Illuminated Parchment, appropriately inscribed, the same to be awarded annually (in perpetuity) to some orthodontist or other person who, in the judgment of the Award Committee, has made a notable contribution to the science and art of orthodontia during the then current year or during some previous period.

The Award Committee shall consist of five members, namely, the president, the president-elect and the vice-president of the American Society of Orthodontists, the remaining two members to be appointed annually by the American Board of Orthodontia.

To defray the expense involved in the preparation and administration of this memorial, contributions are being received from the orthodontists of the United States and other countries. The aggregate sum so received shall be invested in first-grade securities or in an interest-bearing savings account, such investment to have the unanimous approval of the American Board of Orthodontia. Subscriptions may be sent to the Secretary of the Board.

OREN A. OLIVER, President, American Board of Orthodontia.

REPORT OF THE INTERRELATIONS COMMITTEE

Everything which exists today so far as the Third International Orthodontic Congress is concerned has been conducted in a most regular, thorough manner and in strict keeping with the Constitution and By-laws.

The officers of the Second International Congress duly authorized, pursued their duties patiently and thoroughly. They determined that the Third Congress should be in an English-speaking country and on this side of the Atlantic. It was decided that the acceptance of the invitation of Montreal would accentuate the international character of the Congress, since the first meeting was held in the United States. They discharged their executive duties by thus making this decision, and it was done in a way in which orthodontists of Canada exercised no undue influence.

Since this state of affairs was brought into existence, the orthodontists of Canada have accepted their responsibilities with their usual thoroughness and sincerity, and to this extent it is desired on the part of the Committee that these facts be correctly understood.

The Interrelations Committee has been in constant contact with the officers selected for the Third Congress, and everything is in perfect accord.

The following recommendation of the present officers of the Third Congress, Dr. W. W. Woodbury, President General, and Dr. A. W. McClelland, Secretary General, is the result of a thorough consideration of the entire situation.

W. E. FLESHER, Chairman.

April 22, 1936.

Dear Dr. Flesher:

It was decided by the Liaison Committee of the Second International Orthodontic Congress held in London that the Third Congress be held in Canada in 1938.

For the purpose of organization a provisional committee consisting of Dr. McClelland and myself was assigned the task of selecting an executive.

After careful study and deliberation, together with advice from men who are in close touch with the orthodontic situation especially on this continent, it would seem doubtful whether it is feasible to plan definitely for a meeting in 1938, or any definite date thereabouts.

Inasmuch as it seems advisable, therefore, to set no definite time for such a meeting, and yet provide for keeping the matter under review until such a time as definite action appears to be warranted, Dr. McClelland and I would suggest that the Interrelations Committee of the American Society of Orthodontists accept the responsibility that was entrusted to us as an organizing committee according to the Constitution and By-Laws of the Second International Orthodontic Congress.

This would provide that the initiative would pass from two designated individuals to a committee so constructed that continuity of action and responsibility would be assured.

Yours faithfully,

W. W. WOODBURY.

REPORT OF RESEARCH COMMITTEE

At the last meeting, certain recommendations were made by the Chairman of the Research Committee and published in the *Transactions of the Thirty-Third Annual Meeting.* Whether the Society gave any attention to that report and its recommendations, I do not know.

It would seem to me that in order to amplify the duties of this committee, and in order to make the work count, those recommendations ought to be considered by the Society. Whether they are adopted or rejected makes no difference, as long as some attention is given this matter. Ignoring them is no encouragement for further effort. In fulfilling my duties at this time, however, I shall call attention to the extensive work of Albin Oppenheim, published in German and now in its translated form, issued in *The Angle Orthodontist.* In this work, Oppenheim calls attention to the fact that the biologic idea of orthodontic treatment is a myth; that no tooth movement is possible without a certain amount of injury to tooth structure and the surrounding tissues; that appliances, recommended as performing tooth movement in a biologic way, do more damage than others. The work is fully illustrated by examples of experimental tooth movement in living children and should be of interest to all practicing orthodontists. Further progress may be reported by the Chairman in the study of development as it concerns the human face in connection with the occlusion of the teeth. Evidence is rapidly accumulating in support of the results previously reported. Considerable light will be shed upon the orthodontic problem when the work will be completed.

Also the researches of Broadbent are progressing favorably and will add much to the details of what is so badly needed in the understanding of our problem. F. L. Stanton is conducting some research on the growth of the jaws and face, and on the development of occlusion, at New York University College of Dentistry. So far, the work is very promising and is advancing with considerable success.

In a paper read before the Eastern Association of the Graduates of the Angle School of Orthodontia, on "The Future of Orthodontia—A Present Day Problem for the Orthodontist," I made some recommendations which might be of interest to those concerned about the progress of our profession. I am convinced that they will meet with the same fate as did the recommendations a year ago, but I shall nevertheless repeat them. Perhaps they will strike a sympathetic chord among those who are willing to listen. These are as follows:

> (1) It should be the aim of this Society to establish a fund for a special course of lectures to be delivered each year at a different university by an outstanding orthodontist on the most recent and most significant advances in orthodontia.

(2) It should be the aim of this Society to cooperate in the establishment of a fund for the endowment of at least one free scholarship in orthodontia.

(3) It should be the aim of this Society to establish a fund for the endowment of a yearly prize to be awarded for the most outstanding contribution on any practical or scientific subject related to orthodontia.

(4) It should be the aim of this Society to establish a museum in which some of the priceless collections of casts, orthodontic instruments and appliances may be preserved for posterity.

The Chairman is fully conscious of the fact that nothing more will happen to these recommendations than happened to those made a year ago. I shall nevertheless feel fully compensated if they, at least, go on record in the transactions of this Society.

Respectfully submitted,

MILO HELLMAN, Chairman.

Department of Oral Surgery

Edited by

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Articles on oral surgery, radiography, and anesthesia should be submitted to Dr. Robert H. Ivy, 1930 Chestnut St., Philadelphia, Pa. Articles on oral pathology should be submitted to Dr. Kurt H. Thoma, 47 Bay State Road, Boston, Mass.

MANAGEMENT OF CANCER IN AND ABOUT THE ORAL CAVITY

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IN THE preceding articles the various newgrowths of epithelial origin have been classified and described. After perusing such a description, the inexperienced might judge that the clinician always should be certain of his diagnosis, his treatment, and his prognosis. Unfortunately, such is not the case. The pathologists have only partially classified the subject for the therapist. A good deal of our pathologic classification, our theories as to radiosensitivity, and radioresistance, outline the way it should go if our theories are correct, but unfortunately we sometimes can only guess before we treat and may only suspect what happened after we treat.

Distinguished students emphatically advocate procedures in which radiation takes precedence; while, on the other hand, others as sincerely advocate procedures with surgery taking precedence. The question, however, is not one of surgery versus irradiation. For fear it might seem to the reader that the preceding statistics (Cancer In and About the Oral Cavity—Results and Prognosis) were quoted for such a purpose, it should be stated that the statistics of surgery and irradiation are comparable only in a broad sense. Too many important factors and conditions are different in the various groups of patients which are so evident that it seems hardly necessary to emphasize it.

Possibly it will be well to remember that the radium institutes were organized to show what radiation in its various forms could do. The men who manned the various positions were enthusiasts or they would not have been there. Enthusiasm is necessary. Withal they have done a good work in demanding that surgery defend its position or else vacate. The surgeons thrown on the defensive were shown that their cures always were not satisfactorily high, that their mortality was a little fearful, and that sometimes their mutilation was difficult to accept even though they were also accomplished plastic surgeons. A

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This is the eleventh article of a series upon the subject of malignancy in and about the oral cavity. All phases of the subject have been included.

large responsibility was assumed by the irradiation therapist as the sponsor of a new regime. In the lesser circles, the irradiation therapist has sometimes been a menace. He has sometimes lent a hand to irrational procedures in treatment. But no doubt, the boon to future generations which the pioneers in irradiation have offered to the world will compensate eventually for the lives which have been sacrificed on the altar of inefficiency.

The necessity for individualization in the selection of the type of therapy appears obvious. To do this, the ideal therapist should have a knowledge of the pathologic and clinical course of the disease, a knowledge of the rationale and results to be obtained by good surgery, a knowledge of the rationale and results of modern irradiation therapy in all its forms, and finally, not only a knowledge but the equipment and the ability to use each type of equipment.

Although the ideal is biopsy and microscopic examination before therapy, practicality often dictates an exception to such a rule. One exception is that lesion, small and located in a region in which total excision would seem wiser than biopsy. Second, in many other locations, as the anterior tongue, the lip, or the hypopharynx, a certain cellular type may be to a great extent prognosticated by a good clinician so that microscopic study previous to the institution of treatment is of no great advantage. A third exception may be caused by the lesion being located in a situation in which clinical study may be deemed sufficient to warrant surgical exposure for a more careful study of the type and extent of the lesion. The whole lesion is exposed or a biopsy is obtained if methods other than surgical excision are decided upon. The fourth exception is that group of patients in whom there is no question as to the advisability of an operative procedure. Then microscopic study is postponed until after the operative procedure.

On the whole, when one summarizes the essentials of actual practice, a study of the microscopic grouping previous to treatment in only a small percentage of cases will materially influence the type of therapy selected. Where additional valuable information may be obtained in relation to the plan of attack by knowing the cellular grouping or the cellular type, time and trouble should always be taken for preliminary microscopic study before treatment is decided upon.

When the treatment is planned and a cure is contemplated, the scope of the procedure must be sufficient to treat effectively the farthest extension of the disease. It must meet the pathologic necessities of the case. When this cannot be met, the treatment is necessarily only palliative. When the treatment is necessarily only palliative, care should be taken not to interfere inadequately in such a manner that disease is encouraged to progress at an increased rate. Therefore, before treatment is started it is usually wise to determine whether a try for a cure or only for palliation is to be made.

The proper selection of patients to be subjected to excision and the more general use of a two-stage operation in suitable cases with its tendency to a lower operative mortality will tend to throw surgery into a better light than has been the case in the past decade or so. It is not wise to subject to operation nearly as

high a percentage of advanced cases as was formerly done. When surgery cannot be carried on without fairly presentable mortality and not too great mutilation, irradiation methods when they seem rational should most certainly be selected. In advanced cases while surgery offers little, especially in the anaplastic more malignant grades and types, irradiation offers considerable. The problem is to identify this latter group. Certainly little or nothing is gained by subjecting this group to surgery.

There is a group of patients in whom both irradiation and excision offer the greatest prospect of total eradication of the disease. Excision, whether it be with the scalpel, the cautery, or the diathermic knife, used in conjunction with irradiation methods often does not need to be so radical. By the employment of such methods the two great objections to surgery, namely, the mutilation and the mortality, are lessened.

The inexperienced may judge that irradiation causes healing without discomfort or pain. The discomfort that follows intensive irradiation is usually as great as and in many instances considerably greater than that after radical excision. As a matter of fact, in some instances excision may be indicated after irradiation for the purposes of eliminating some of the pain of heavy irradiation.

REGIONAL MANAGEMENT OF EPIDERMOID CARCINOMA

With the idea of expressing a certain amount of personal opinion the management of epidermoid carcinoma will be discussed in a regional manner.

(a) *Carcinoma of the Lip.*—In the small localized epidermoid carcinoma of the lip, no particular preference is given whether we treat the lesion with radium or by excision. When the lesion is spread along a considerable length of the lip and is rather superficial, radium is given preference. When the bone is involved, radium is not used. The local lesion is excised and a considerable layer of the bone is destroyed with a soldering iron or endothermic button. When radium has already failed to heal the local lesion, surgery is used. The original irradiation application may or may not have been correctly applied. When the infiltration of the local area involves most of the lip, although radium and x-ray are generally used first, it is often considered wiser to excise the local lesion when the lymphatic glands are operable.

Whenever possible after surgical excision an immediate plastic operation is done to rebuild the lip. Thus, the excision and the repair are done in one operation. When the excision and the repair entail a fair amount of surgery, the glandular region is taken care of at a separate operation, as a rule. But, when the patient is in good condition and the plastic repair is one that can be done quickly, in many cases the whole procedure—the removal of the local lesion, the repair of the resulting defect and the removal of the tributary lymphatic area—is completed at one operation. When it is necessary to destroy a part of the bone, the repair of the lip is not done until the bone has had time to sequestrate and separate.

The tributary lymphatics in small early cancers of Group I (Broders) usually are treated conservatively. As a rule, unless the patient is under our im-

mediate observation continuously, most other cases of lip cancer are considered as needing a neck dissection before the glands are palpable. The exceptions possibly are: the rather advanced cases of Group IV (Broders), the cases in which the condition of the patient contraindicates the operation. Rather advanced cases in Group IV (Broders) or recurring fixed epitheliomas are probably best treated by radium.

Prophylactic irradiation of the neck is not considered to be of any great value. When it is given in quantities that might be considered lethal, if a neck dissection is required subsequently, it may be almost impossible to perform the operation.

In most cases after a neck dissection is performed, heavy deep x-ray therapy is given. How much good it does is questionable, but it is given anyway. When there are financial contraindications to using both surgery and irradiation, it is considered that the patient has lost little if the irradiation is not given.

(b) *Tongue.—(1) Anterior:* In carcinoma of the anterior tongue when the lesion is small, it is totally excised with the knife. When the lesion is larger involving a considerable part of the tongue, radium needles or radon seeds are implanted to irradiate thoroughly all parts of the involved organ. A biopsy is taken. From eight to ten skin erythema doses are given to the tumor mass. The needles are left in place from five to seven days. At the end of this period with the high voltage x-ray an additional two or three skin erythema doses of irradiation by cross fire methods are given to the neck and the tumor. When any thickening or residual evidence of carcinoma remains after a period of six to eight weeks, the local tongue lesion is excised or destroyed with the endothermic needle or button, and usually a unilateral neck dissection en bloc is performed whether or not the nodes are palpable. Although this is generally our method of procedure at the present time, it is thought that total excision of the local lesion is just as likely to obliterate the local lesion permanently. In a considerable number of instances apparently viable carcinoma cells are found in the excised irradiated tissue after the six- or eight-week period. When the lesion extends into the floor of the mouth and lies adjacent to or involves the jaw bone, in some instances a preliminary treatment of interstitial irradiation and external x-ray is given, but usually main reliance is placed upon surgery. In the latter case, usually by the lateral Kocher approach, the tissues of the submaxillary triangle including the submaxillary gland are removed en bloc; the mouth is entered just within the mandible from beneath. The local lesion is excised as widely as seems feasible, and a part of the thickness of the jaw bone is destroyed with a hot soldering iron when the bone is approached. When the bone is actually invaded, almost all or the whole thickness of the bone is destroyed or entirely resected. It takes about two months for the cauterized part of the mandible to separate. This is a disadvantage. The procedure, however, has the advantage of not adding the additional operative mortality that goes with a complete resection of a segment of the mandible. When one dares to leave a rim of live bone, the contour of the face remains practically unchanged. Some workers advise the endothermic button for destruction of a layer of bone, but, as a rule, I have not found that sufficient mandible is destroyed by this latter method.

As previously stated, an excision of the tributary lymphatics of the submaxillary and submental triangles is a part of this operative approach. When involved nodes are present in the submaxillary triangle, the upper deep cervical nodes are excised. When any of the upper deep cervical nodes show evidence of cancer invasion, a complete neck dissection is done but practically always at a later date after recovery from the wide local excision.

(2) Posterior: In carcinoma of the posterior tongue often a study of the microscopic picture is of value in determining the type of therapy that should be given. Lymphoepitheliomas, transitional cell epitheliomas, and lymphosarcomas should be treated by irradiation methods. In lymphoepithelioma or lymphosarcoma heavy cross fire external irradiation alone may cause a total disappearance of the neoplasm. In the transitional cell epithelioma interstitial irradiation is depended upon and the irradiation need be only moderately intense.

In squamous cell carcinoma of the posterior tongue located in a position too far advanced for excision methods to be applicable, which generally is the case, radium needles or radon seeds are inserted in sufficient numbers to give from seven to eight skin erythema doses to the mass. If it is thought necessary, radium is also inserted from below just above the hyoid bone through a skin incision. The muscular fibers of the tongue are separated in the midline, and radium needles or seeds are implanted from below. When the needles are used, they are left in place from five to seven days. In this location if the patient can afford the additional expense, radon is considered to be easier to apply. After the interstitial irradiation has been applied by cross fire methods, from two to four skin erythema doses of high voltage x-ray are added.

Provided that the local lesion heals, when the lesion is an adult squamous cell carcinoma and is somewhat unilateral, a unilateral neck dissection is usually done six to twelve months later whether the glands are palpable or not. If at a later date a palpable gland appears on the opposite side of the neck and there is then no other evidence of cancer, a second neck dissection would be considered as not irrational; although it is recognized that as a rule bilateral neck dissections are of no avail.

When a suspicious residual thickening or hard area remains in the local lesion after two months, if possible it is excised or destroyed. In a few instances in which the lesion is well posterior and somewhat unilateral and sufficiently localized, the transhyoid approach is considered a procedure of value. The operation is rational and gives good results in low unilateral lesions and those involving the epiglottis.

To summarize carcinoma of the tongue, usually unless the local lesion is located in an ideal situation for total excision, irradiation methods are given a chance and are watched with some skepticism but also with some hope. When it becomes evident that the effect of irradiation is questionable, sometimes excision methods are resorted to and rarely when it is deemed necessary very radical surgical methods are still employed as a final method. When the local lesion has extended beyond any rational excision method from an anatomical standpoint or when the neck glands have perforated the gland capsule and become fixed or the

cervical chain of glands on both sides are evidently involved, one is forced to place reliance upon irradiation methods—usually with only palliative intent. When an attempt is made to obtain a cure, theoretically a lethal dosage is given by the use of both interstitial and external irradiation.

(c) *Cheek and Palate.*—Practically the same treatment is used as for anterior tongue lesions, that is, excision in the smaller less malignant types of growths and in those with more of a tendency to infiltration, interstitial irradiation, external irradiation and final excision or destruction with the endothermic knife, if all signs of the lesion do not entirely disappear within two months. Thus, if it appears that the healing of the cheek is complete, after irradiation, excision or destruction is omitted. If the local lesion was somewhat advanced and it is thought to have been destroyed, a unilateral neck dissection with removal of the buccal gland is considered safer than watchful waiting. In patients farther advanced with deeper penetration of the cheek or extension to the jaw or extension to the muscles of mastication, excision of the lesion with cautery destruction of the involved bone is considered a rational procedure. After six or eight months a plastic operation is performed to fill in the defect. When the muscles of mastication are encroached upon, practically nothing is to be gained by the use of irradiation methods, and valuable time is lost by procrastinating with it. Radical surgery offers some chance of a cure. After the operation, heavy external irradiation is easily given to the open wound in doses of sufficient size to be lethal to squamous cell lesions. When the excision is very complete, a small percentage of five-year survivals will be obtained.

When the neck glands are fixed, the situation is handled by interstitial irradiation and external irradiation as seems indicated along the lines described under tongue carcinoma.

(d) *Antrum and Paranasal Sinuses.*—In early lesions in which the diagnosis is not definite, the antrum is entered through the alveolar cheek fornix above the canine fossa. Exploration is done under direct vision and a biopsy taken. When drainage is considered insufficient, a window is also made through the median wall of the sinus into the nasal cavity. In an early lesion adequate irradiation can be given by inserting a heavily filtered radium tube surrounded with gauze through this window.

When there is no question concerning the diagnosis, external irradiation is usually advisable before the antrum is entered. The idea is at least to devitalize partially the cancerous tissue and to eliminate some of the secondary infection. In more advanced antral carcinoma usually the antrum is entered directly through the alveolar ridge, the lateral palate, the alveolar cheek sulcus, or even through the external cheek. Usually the tumor has already perforated one of these situations so that one has only to destroy tumor as one advances within the antral cavity.

For a number of years past, we have used a small curved soldering iron for gaining entrance into the frankly carcinomatous antrum, but nowadays it will be found that the endothermic apparatus is a more graceful way of accomplishing the same thing, namely, free exposure and free drainage. The filled antral cavity is hollowed out, and practically all the tumor tissue is removed or de-

stroyed. It is possible that the heat of the soldering iron destroys cancer tissue to a somewhat greater depth than one could destroy with the endothermic loop, but the ease of excision with the diathermic loop and a subsequent lower mortality more than compensates for this hypothetical idea. After the antral cavity has been hollowed out, most of it can be observed under direct vision. Finger exploration then supplements the inspection.

Intracavity irradiation with radium is depended upon principally for the cure. Two or three tubes containing about 50 milligrams in all of heavily filtrated radium are inserted into the cavity surrounded by a gauze pack. The radium is left in position until it is figured that from eight to ten skin erythema doses have been delivered to all outlying cancer cells from the inside. When the nose tends to be invaded, a 10 to 15 milligram tube is placed in the nostril at the point of likely invasion. This is usually toward the ethmoidal region.

When the orbital cavity is invaded, the eye is removed and the contents and floor of the orbital cavity are cauterized and irradiated as indicated.

As antral carcinomas do not tend to metastasize to the neck early, as a rule, a policy of watchful waiting is adopted when there is no clinical evidence of metastasis. Otherwise, if palpable or fixed, the glands are handled in no way different than when involved after a local lesion in the tongue, the floor of the mouth, or the cheek.

The antrum is observed and dressed through the mouth. Sequestrums are removed as they loosen. After healing occurs, a removable prosthesis is fitted into the antral cavity. This gives the patient biting surface and prevents food from entering the antral cavity.

(e) *Nasopharynx.*—In this region a preliminary microscopic study is of value. In some patients the exact pathologic picture should be known before treatment is started. When the lesion is of a radiosensitive type, such as a lymphosarcoma, a Schneiderian membrane tumor, an adenoid cystic epithelioma, the procedure of treatment should be different than when one is confronted with an adult squamous cell carcinoma. In the former four types of carcinoma, heavy irradiation externally by cross fire methods may be all that is necessary to cause a local disappearance of the neoplasm. In the transitional cell epithelioma, however, and sometimes in other tumors, some type of irradiation from within is added to supplement the external irradiation.

When the lesion is a fairly adult squamous cell epithelioma, a much heavier irradiation dosage is necessary if any chance of obliterating the tumor is to be hoped for.

External irradiation is usually given preliminary to internal therapy. Early squamous cell lesions can in a few cases be fairly completely excised or destroyed by the endothermic needle, but ordinarily heavy internal irradiation supplemented by external irradiation is depended upon as the basis of treatment. A combination of external and internal irradiation and excision with the diathermic loop is a rational method of handling some of these lesions. The soft palate may be split to gain adequate exposure. It is immediately resutured after the destructive procedure.

In the nasopharynx a capsule containing radium properly filtrated may be pulled up above the palate by the method of passing a catheter through the nostril backward, catching it in the pharynx, pulling it forward into the mouth and tying a string to the catheter. The soft palate should be protected by additional filtration with lead. The normal nasal mucosa is quite sensitive to irradiation so that the dosage should be delivered with considerable caution as to quantity because of the danger of local burning. The atrophic rhinitis which may result is very annoying.

When the lesion is a squamous cell and a unilateral epithelioma, it is probable that a conservative attitude regarding the cervical lymphatics is not justified. But the conception of excision of the cervical lymph nodes has the defect that the retropharyngeal glands cannot be removed. When it appears that most likely the metastasis may be bilateral, a conservative attitude toward the tributary lymphatics is adopted. When the lesion is one of a radiosensitive or unusually anaplastic type, intensive irradiation only is used to attempt to control the glandular areas. When all signs point to the tumor as being of an anaplastic and radiosensitive type, neck dissection is probably useless. For advanced or fixed metastatic glands, external irradiation plus interstitial irradiation offers all that can be done. In an occasional case, for the time being, the nodes my recede to almost normal size. Even if this does not occur, a considerable palliative period with some recession or slight growth may intervene before the final termination.

(f) *Mesopharynx.*—In the mesopharynx are found some tumors which are distinctly radiosensitive. Preliminary biopsy and microscopic examination may therefore be of considerable value before deciding upon the procedure to be employed. As previously mentioned, lymphoepithelioma and lymphosarcoma are distinctly radiosensitive and will disappear under heavy external irradiation alone. The transitional cell epithelioma is also radiosensitive but requires usually some interstitial irradiation plus external irradiation to cause a disappearance of the neoplasm. Group IV (Broders) type squamous cell carcinoma usually does not give a good result after surgical excision, but something may be offered by both external and internal irradiation.

The majority of tumors in this region are, however, of the ordinary squamous cell type. When early and located on the pillars or lateral pharyngeal wall, a local excision is possible. But, unfortunately, in the majority of tumors of t' type, the extent of the infiltration is rather too great to allow an adequate excision by intraoral methods. When the lesion is an adult squamous cell carcinoma and is operable, one is justified in doing a high pharyngotomy and completely excising the lesion if the patient's general health does not contraindicate. Even when not palpable, the tributary lymphatics should be removed because a rather high percentage metastasize. The neck dissection may be done at the original operation or as quickly as the patient's condition permits after excision of the local lesion. In the radiosensitive types and the excessively anaplastic types—that is, in Group IV (Broders) carcinoma—it is usually useless to do a neck dissection. When the glands are fixed, interstitial irradiation plus external irradiation is used.

The anatomy of this region has often deterred the usual therapist from applying the correct principles with the thoroughness necessary to obtain a fair percentage of good results in the treatment of carcinoma of this region.

(g) *Hypopharynx.*—In a squamous cell carcinoma in the hypopharyngeal region which is yet operable, a lateral pharyngectomy is done according to the methods advocated by Trotter and the lesion excised. When it appears that the lesion is beyond giving a fair chance after excision, the next best chance in a lesion not too far advanced is offered by a surgery of access which includes excision of the thyroid cartilage or greater cornu of the hyoid. This allows the operator to come down immediately onto the pharyngeal wall. When the tumor is not amenable to excision, radium is applied directly over the lesion without the interposition of cartilage in a sufficient quantity to deliver about eight to ten skin erythema doses to all parts of the lesion. In addition to this amount of radium, a heavy dosage of high voltage x-ray is delivered by cross fire methods. When the cartilaginous "box" of the larynx is involved, practically no cure will be obtained by irradiation methods. Radical excision of the involved cartilaginous "box" offers the only hope of a cure. In the advanced cases, obviously beyond the hope of a cure, external palliative irradiation alone is considered more appropriate.

The advocacy of this method of treatment will be disagreed with by many, but the lesions in this location are of the squamous cell variety and in the early stages are amenable to surgical extirpation; and practically no cures are obtained by the usual methods of internal and external irradiation. It must be remembered that these lesions are not radiosensitive in the true sense of the term. When radium is selected as the method of treatment, if one does not remove the cartilaginous partition and doses are delivered theoretically considered to be lethal, a cartilaginous liquefaction and perichondritis are the usual result. To place properly irradiation foci interstitially from the inside is usually impossible because of the anatomic location. The extent of the lesion is difficult to judge and one tends to undertreat it.

In unilateral carcinoma of the hypopharynx we do not treat the tributary lymphatic glands conservatively. Early metastasis is the usual occurrence. Early excision of the glands is warranted when an attempt for a cure is being made. The time of the glandular excision depends upon the condition of the patient. As for epidermoid carcinoma originating elsewhere about this region, inoperable glands are treated with external irradiation and radium interstitially.

CONCLUSION

In conclusion one may say that a courageous man with sound knowledge and sound judgment is required to treat and care for malignant conditions efficiently in and about the mouth. After treating the early or moderately developed malignancy, if the patient returns with a recurrence, very often the therapist criticizes himself for lack of courage realizing that the end-result in such patients is one hundred per cent in one way. On the other hand, radical procedures when the patient is already beyond hope of obtaining a cure are not humane.

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FACIAL CLEFT OR FISSURAL CYSTS

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IT IS of great importance to differentiate the various types of cysts which occur in the jaws. Some cysts are distinctly of odontogenic origin, as the follicular cyst forming from the tooth follicle and the radicular cyst forming from a dental granuloma containing epithelium. Other cysts are more difficult to classify, especially when large, because in the advanced stage their origin is not easily determined. Cysts which occur between the roots of adjoining teeth or attached to the distal surface of a third molar have in the past been classified as parodontal cysts, forming either from a supernumerary epithelial bud which fails to develop into a supernumerary tooth, or else from an epitheliated granuloma occurring at the side of the tooth in relation to an aberrant root canal.

It is interesting, however, to note that parodontal cysts occur in order of their frequency: first, in connection with a third molar; second, between the maxillary cuspid and the lateral incisor; and, third, between the central incisors. Those in the third molar region are true parodontal cysts and may ultimately occupy a large area in the ramus. The second and third varieties may be of an entirely different character, and many times are in no way associated with the development of a tooth or derived from tissue of dental origin.

ETIOLOGY

Cysts in the jaws of nonodontogenic origin may form from enclaved epithelial cells at the place of union of the embryonic processes forming the face, the so-called clefts or fissures of the face. The clefts which most frequently give rise to cysts are the nasoalveolar cleft, the palatal cleft, and the globulomaxillary cleft.

The *nasoalveolar cleft cyst* forms at the junction of the globular, lateral, nasal, and maxillary processes. This cyst is firmly attached to the bone at the wing of the nose where it may be lying in a depression caused by pressure erosion. The greater part of the cyst, however, encroaches on the nasal cavity, causing a bulging inside the nostril and extends also into the vestibule of the oral cavity. It is, therefore, located in the base of the upper lip and causes a noticeable swelling. Cases have been reported by Klestadt,[1] Döring,[2] Schroff,[3, 4] Schmidt,[5] and the writer.[6]

The palatal cyst. Several types of cyst form on the palate. First the cyst of the papilla palatine, which I recently described,[7, 8] and the better known cyst of the incisive canal. Neither of these are true fissural cysts as they are formed from the nasopalatine duct, either in the incisive foramen or in the incisive canal, and not from the enclaved epithelium at the junction of the palatal processes.

The *median cyst,* however, is a true fissural cyst. The median fissure is often visible in the x-ray picture of the anterior part of the maxilla in children (Fig. 1). If epithelial rests from the globular processes become enclosed here, a cyst may later develop from them between the roots of the central incisors (Fig. 2). It is differentiated from a radicular cyst by the fact that it does not include the apex of a tooth, and that the teeth may be normal in every way. It must further be differentiated from the incisive canal cyst, which is located more posteriorly in the median line and is round or heart shaped (Fig. 4), rather than laterally compressed and oval. Even though the teeth have been lost it can still be recognized by its location in the alveolar process and its oval shape (Fig. 3). Median cysts may grow to a much larger size, however, and may give typical clinical symptoms even when small. The commonest

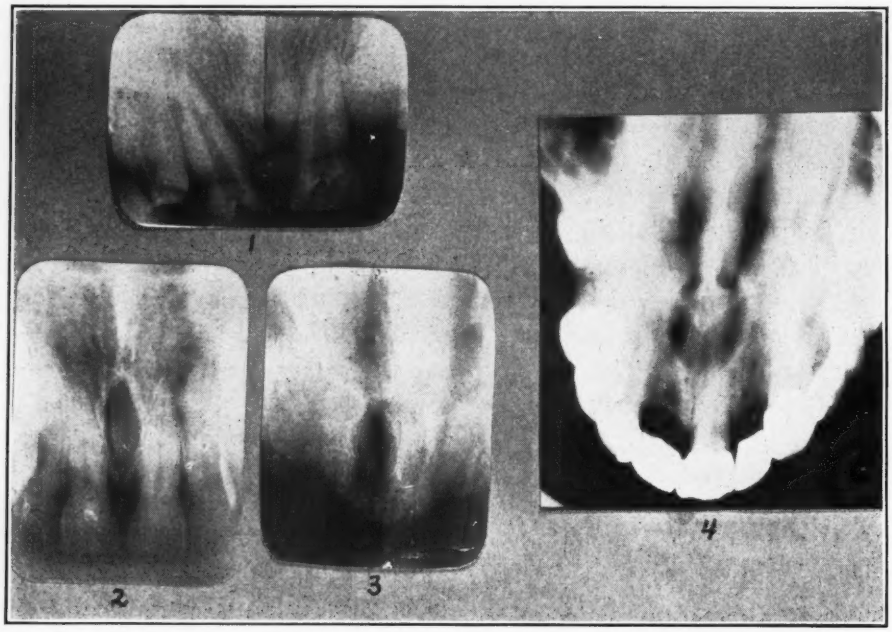

Fig. 1.—Palatal fissure.
Figs. 2 and 3.—Median cyst.
Fig. 4.—Incisive canal cyst.

results are diastema between the central incisors and a slanting of these teeth toward the median line, both conditions being due to the exertion of pressure of the expanding cyst on the roots of the teeth. Bulging of the palatal surface anterior to the papilla palatina occurs in larger cysts and especially in edentulous jaws.

The x-ray examination helps greatly in arriving at the correct diagnosis. The incisive canal cyst is best seen in the occlusal film (Fig. 4) taken in an almost vertical direction, while the median cyst is shown to advantage in a regular dental film of the alveolar portion of the bone (Fig. 2).

Pathologic examination of the cases that came under my observation showed a very thick connective tissue sac with an abundance of collagen fibers

and a lining of epithelium on the surface of a small lumen. When there is swelling of the palate, there is generally marked round cell infiltration demarking chronic inflammation.

The *globulomaxillary cyst* also is a true fissural cyst. It forms at the junction of the globular and maxillary processes and therefore may occur bilaterally, or on one side only. That there may be a hereditary tendency is shown in Case 3, to be reported below. This cyst has in the past been mistaken for a radicular cyst, because when large it may grow around the apices of the adjoining teeth. While parodontal cysts may form between the roots of any of the teeth in the forms described, globulomaxillary cysts occur only between the lateral incisor and the cuspid. Here, where the premaxilla joins the maxilla, is the place that cyst formation is most common; and, when the cyst occurs between perfectly normal teeth, there is no doubt that in many cases it originates from epithelium enclaved in the fissure. This is the same place which contains the alveolar cleft if a cleft palate extends to the lip.

Fig. 5. Fig. 6.

Fig. 5.—Globulomaxillary cyst.
Fig. 6.—Globulomaxillary cyst and apical granuloma on lateral and central incisors.

The globulomaxillary cyst therefore forms in the alveolar process between the roots of the lateral incision and the cuspid. The first effect is a diversion of the roots of these teeth (Figs. 5 and 6). Later the cyst may extend into the maxilla and occasionally it may expand laterally and involve neighboring teeth. Fig. 6 shows such a case, which at first might be diagnosed as a radicular cyst formed from an apical granuloma on the lateral and central incisors. A radicular cyst, however, would not dip down between the lateral incisor and the cuspid and cause them to diverge. Also according to the history these two teeth were injured while the patient was playing football, and were subsequently treated. At the operation it was disclosed that the abscess cavity surrounding the teeth was separated from the cyst. The cyst therefore must be classified as a fissural cyst, just as the one shown in the x-ray in Fig. 5, a case in which all the teeth were normal.

The first clinical indications of a globulomaxillary cyst are changed position of the lateral incisor and of the cuspid. Later there may be a bulging of the alveolar plate at the labial surface of the maxilla, often associated with

obscure sensation of pressure. In some cases the swelling has been previously incised with resultant discharge of the cystic fluid. In other cases, infection may be carried into the cyst from a neighboring tooth, when the face may swell and the discharge may become purulent in nature. Often a permanent fistula forms on the gingiva.

Diagnosis of a globulomaxillary cyst therefore depends to a great extent on careful clinical examination and x-ray investigation. It is differentiated from a radicular cyst because the latter does not extend between the teeth, and from other cysts by its location between the lateral incisor and the cuspid. The adjoining teeth may be perfectly normal even though the x-ray examination shows them involved. It is well to consider that teeth may be projected into the dark area produced by the cyst on the x-ray film, while actually they are located labially or palatally to it.

Pathologic examination in the cases examined showed a very thick and dense cyst wall. In Case 4 the epithelium formed deep projections into the underlying tissue. When irritation or infection has set in, a chronic inflammatory reaction is visualized by marked round cell infiltration.

CASE REPORTS

CASE 1. Median cyst. Patient, I. D., with perfectly normal incisors, had sensation of pressure in the anterior part of the maxilla.

History.—For several months a sensation of pressure was felt in the maxilla. Both central incisors were slightly sensitive, the right more than the left. The patient's dentist had drilled into this tooth on the palatal side to test the neurility. The pulp reacted normally and the cavity was closed again.

Examination showed a slight space between the central incisors. The teeth were sensitive to percussion, although there was no cause for occlusal trauma. X-ray examination showed an elongated cystic area in the median line not involving the apices (Fig. 2).

Diagnosis.—Median cyst.

Operation.—With local anesthesia a semicircular incision was made, and after the mucoperiosteal flap was retracted, the bone overlying the area was removed with a chisel. A tough fibrous sac was revealed and enucleated. When cut, a small amount of fluid escaped from a small lumen.

The teeth were not exposed and the wound was closed with sutures. Healing was uneventful and symptoms disappeared.

CASE 2.—Median cyst. Patient, aged fifty-eight years, complained of swelling under the plate on the anterior part of the palate.

History.—She had had all teeth extracted a number of years before, and had worn a full denture with comfort until lately when it caused pain and did not fit so well.

Examination.—The condition of the mucosa was normal except for the anterior part of the palate in the median line. Here there was evidence of inflammation and swelling. X-ray examination revealed a small cystic area in the median line of the alveolar process (Fig. 3), too far anterior for an incisive canal cyst. Diagnosis of median cyst was made. This cyst apparently had expanded laterally, not being obstructed by adjoining teeth.

Operation.—Incision was made on the palatal side. The bone had become resorbed and the cyst sac could be removed in one piece. It was thick walled and contained mucopurulent fluid. The wound was closed by sutures.

Pathologic examination showed a thick fibrous sac with an epithelial lining of the lumen. Perivascular infiltration gave evidence of inflammation.

Case 3.—Globulomaxillary cyst with history of inheritance. Patient, H. J., aged sixteen years, complained of a small pimple on the gingiva.

Family History.—Of no importance except that the mother had had an operation for cystectomy. Her cyst was located in the maxilla between the right maxillary lateral incisor and the cuspid.

Past History.—Patient had been well except for childhood diseases and severe adolescent acne which had not yielded to any kind of treatment so far. Patient had been receiving orthodontic treatment for one and one-half years and had never had any accident involving the teeth or jaws.

Present Illness.—Two years before, a little pimple formed on the gingiva. It had never caused any pain, but occasionally the patient pricked it, which allowed a small amount of discharge to escape. Lately, however, the swelling had increased to the size of a pea, and fluid discharged in larger amounts, every two or three days.

Local Examination.—Patient presented a well cared for mouth with a few fillings in good teeth and no parodontal disease. However, there was a fistulous opening on the alveolar gingiva, halfway between the labial fold and the gingival margin, and between the ridges formed by the roots of the cuspid and the lateral incisor. There was a tenderness on palpation, and a slight amount of yellowish discharge could be squeezed out when pressure was applied high up on the areolar gingiva.

Roentgen Examination.—A large oval cystic area was seen to extend from the alveolar ridge well into the maxilla (Fig. 5). It caused divergence of the roots of the cuspid and the lateral incisor. All the adjoining teeth were normal; they had not been filled and there was no evidence of caries or pulp infection. The effect on the position of the teeth led to the conclusion that the cyst had originated between the roots, and therefore could either be classified as a parodontal cyst such as forms from supernumerary enamel organs (follicular parodontal cyst), or from epithelial remnants in the periodontal membrane (radicular parodontal cyst), or as a globulomaxillary cyst at the junction of the premaxilla and maxilla. The location and the hereditary factors favor the assumption that this was a fissural cyst formed between the globular and the maxillary processes.

Operation.—With gas and ether anesthesia preceded by nembutal gr. iii, a semicircular incision was made along the labial gingiva. The mucoperiosteal flap was separated from the bone and retracted; an opening in the bone corresponding to the gingival fistula was seen. This opening was enlarged with rongeur forceps when the cyst sac became visible. While this was dissected out, a clear light yellow fluid escaped. The sac was found thick and tough but firmly attached to the alveolar margin between the teeth. This is characteristic of

fissural cysts. It was finally detached and removed in toto. Inspection of the cavity showed healthy normal bone, the teeth did not extend into it and were unrelated to the cyst.

Pathologic Examination.—Pathologic examination showed a very thick cyst sac. The connective tissue membrane was lined on the inner side with stratified squamous epithelium, with deep projections extending into the underlying tissue. There was evidence of inflammatory infiltration affecting both the connective tissue and the epithelium (Fig. 7). The lumen of the cyst was filled with blood corpuscles due to operative trauma.

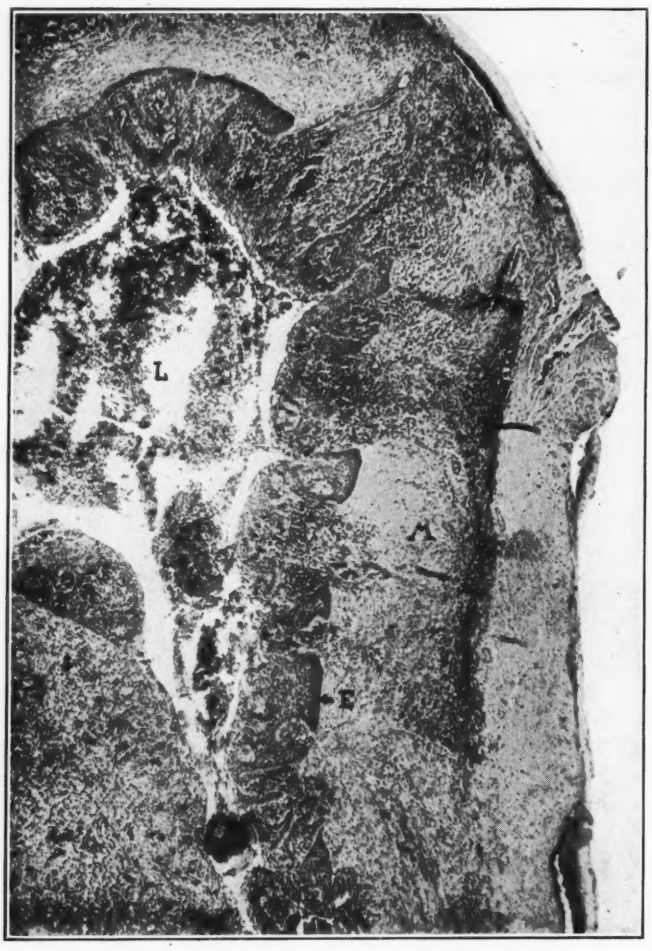

Fig. 7.—Photomicrograph of cyst wall removed from globulomaxillary cyst shown in Fig. 5. *L,* lumen; *M,* cyst membrane; *E,* epithelium lining the lumen.

Diagnosis.—Operative findings indicated that this cyst was of the fissural type, and there was nothing in the pathologic findings that was not consistent with this opinion. The inflammation was accounted for by the gingival fistula. The cyst was a globulomaxillary cyst.

Case 4.—Globulomaxillary cyst. Patient, R. K., aged fourteen years, complained of a swelling on the labial gingiva between the maxillary cuspid and the lateral incisor.

History.—Five years ago he had an accident; he was in a collision with an autobus. He lost consciousness. Two years ago he was injured by a bicycle, which hit his jaw; but he had received no treatment until three months ago when he was hurt playing football, which caused the death of the pulps in the maxillary right central and lateral incisors. His dentist had removed the pulps and filled the root canals. An x-ray picture taken to check the root canal fillings revealed a cyst, and the patient was referred for treatment.

Local examination showed a swelling of the maxilla in the region of the canine fossa, which in an occlusal x-ray film (Fig. 6) was shown to be caused by a cyst located between the two teeth, pressing the roots apart. Adjoining this oval area is an extension surrounding the roots of the lateral and the central incisors, indicating periapical infection.

Operation.—With gas and intrapharyngeal method of ether anesthesia, an incision was made on the gingiva along the lower border of the cyst. The mucoperiosteal flap was dissected from the very thin bone and retracted. The bone could be cut with a knife, and after removal of the outer plate the cyst sac could be dissected out. It contained a purulent fluid. Inspection of the cyst cavity showed an extension toward the apices of the lateral incisor and central incisor filled with granulomatous tissue, which after extraction of the teeth was removed by curettage. After the gingival flap was pressed into the bone cavity, a mercurochrome gauze packing was inserted into the wound.

Diagnosis.—X-ray and operative findings led to the diagnosis of globulomaxillary cyst.

CONCLUSION

Two types of fissural cysts have been described. These are not of odontogenic origin, but form from enclaved epithelium at the union of the embryonic processes forming the face. One, the median cyst, occurs in the median line between the roots of the incisor teeth, is located in the alveolar part of the maxilla and not in the palate where the incisive canal cyst is found. The other, the globulomaxillary cyst, develops between the lateral incisor and the cuspid, causing these teeth to diverge, and should be differentiated from a radicular type of odontogenic cyst.

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SIGNIFICANCE OF YEASTLIKE ORGANISMS IN DENTURE SORE MOUTH*

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DURING the past year a few patients have come under my observation who complained of a painful sensation of the mucous membrane beneath the dentures they were wearing. The appliances appeared to fit correctly and the occlusion seemed to be balanced. Several of these patients I had the opportunity to study in association with Dr. Cahn who recently reported his observations[1] on this complaint under the title "Denture Sore Mouth," wherein he describes this condition as follows:

"There is usually a zone of redness which may vary from a spot a centimeter in diameter to an area corresponding to the imprint of an entire partial denture. At times there are also white patches that can be easily peeled off the surface of the tissue. Ulceration plays no part in the picture. The condition that most interested me was the one in which the entire pattern of the plate was seen on the palate. In this type the mucosa was intensely red and shiny with a texture somewhat like satin."

Dr. Cahn found in sections of tissue from such areas that "the epithelium was atrophied, degenerated and densely infiltrated with mononuclear cells. There was no surface ulceration. Despite the atrophy and degeneration, the upper layers remained intact. The inflammatory exudate that largely displaced the epithelium occupied the subepithelial zone of the corium. The rest of the corium was not inflamed. The picture was one of intense chronic inflammation probably induced by a toxic irritant."

I have obtained from such cases growth of yeastlike organisms belonging in practically all instances to the monilia group. These organisms were accompanied by cocci, the majority of which were of the viridans type. The bacteriologic investigation was conducted as follows:

A. Material was scraped with a sterile loop from the reddened areas or white patches and inoculated on Sabouraud's medium, honey agar, blood plates, and in glucose infusion broth.

B. Portions of the material were also examined microscopically in moist preparations and in smears stained by Gram's method and with aqueous gentian violet.

C. The palatal and mandibular surfaces of the dentures were rubbed with a sterile swab moistened in sterile water. The swab was then examined as outlined above.

Direct microscopic examination shows that in some instances the yeastlike cells are present in moderate to large numbers, while in other cases only

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a few yeastlike organisms may be found. Mycelium may be present or absent. When present it is found only in small amount and in short segments (Fig. 1).

Cultured growth on Sabouraud's medium (a simple agar medium, pH 5.5 containing glucose and maltose) or on honey agar occurs within twenty-four to forty-eight hours as creamy white, moist, raised colonies resembling somewhat large staphylococcus colonies. The colonies become larger and may coalesce as they grow older. After one to two weeks the colonies become dry and wrinkled. Mycelium may then be seen penetrating into the agar as irregular hairlike projections. Corn meal agar is particularly suitable for the development of mycelium and the study of the attachment of the yeastlike cells. The mycelium is septated and branched, and the budding cells may be found in clusters or short chains at the ends of the segments (Figs. 2 and 3).

Several animals, guinea pigs and rats, were inoculated by first anesthetizing with ether and then scarifying the mucous membrane of the mouth and rubbing

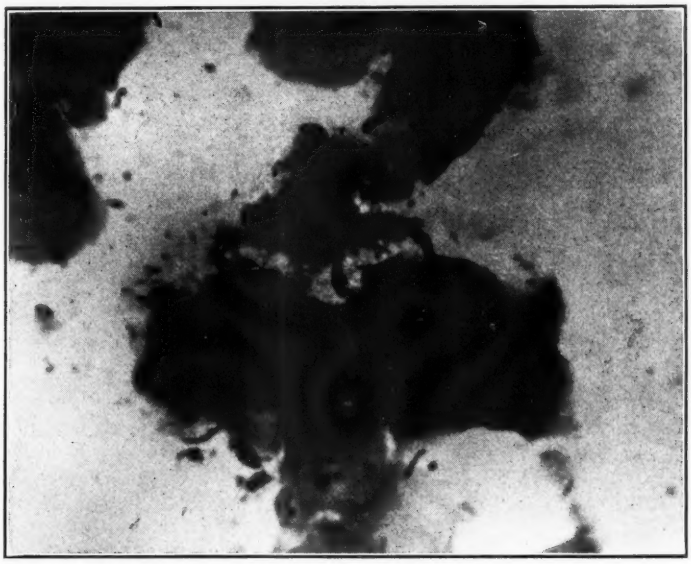

Fig. 1.—Yeastlike cells, some embedded in epithelial cells of mucous membrane. Oil immersion objective, No. 4 ocular.

some of the monilia into the injured area. No observable symptoms developed. Further animal experimentation is now in progress and will be reported at a later date.

The presence of monilia in the apparently normal mouth, throat or vagina has been reported by various observers. Tanner, Lampert and Lampert[2] have found *Monilia albicans* in 10 per cent of normal throats. Benham[3] calls attention to the fact that *Monilia albicans* can be obtained from the mouth or intestines even when there is no evidence that it is pathogenic; however, she questions whether such infestation is entirely harmless to the host. Henrici[4] states that monilia are primarily parasites of the mucous membrane and thus thrush occurs most frequently in the mouth and not uncommonly in the vagina (in pregnancy). He also mentions (p. 174) that thrush is one of the commonest of the mycoses of man, most frequently a disease of the nursing infant, but "also occurs in adults

generally as a terminal event in such wasting diseases as typhoid fever, tuberculosis, or cancer, especially in patients who have been comatose or nearly so for some time *where dryness of the mouth seems to favor the infection.*'' Jacobson[5] writes concerning the presence of monilia in normal mouths or vaginas, ''Not infrequently, however, either because of an impaired state of health of the host, due to an antecedent affection or infection or due to a deficient immunity mechanism or other unknown reasons, the organisms acquire parasitic habits, become pathogenic and excite histological tissue reactions with resultant characteristic lesions.'' It would appear then that yeastlike organisms may inhabit the normal mouth without giving rise to pathologic lesions. However, when a lowered tissue tone develops, due to either general or local disturbances, infections by these microorganisms may occur. The wearing of dentures in the mouths of some individuals may affect the mucous membrane, lowering its tone, and also afford mechanical protection for the yeastlike organisms against the

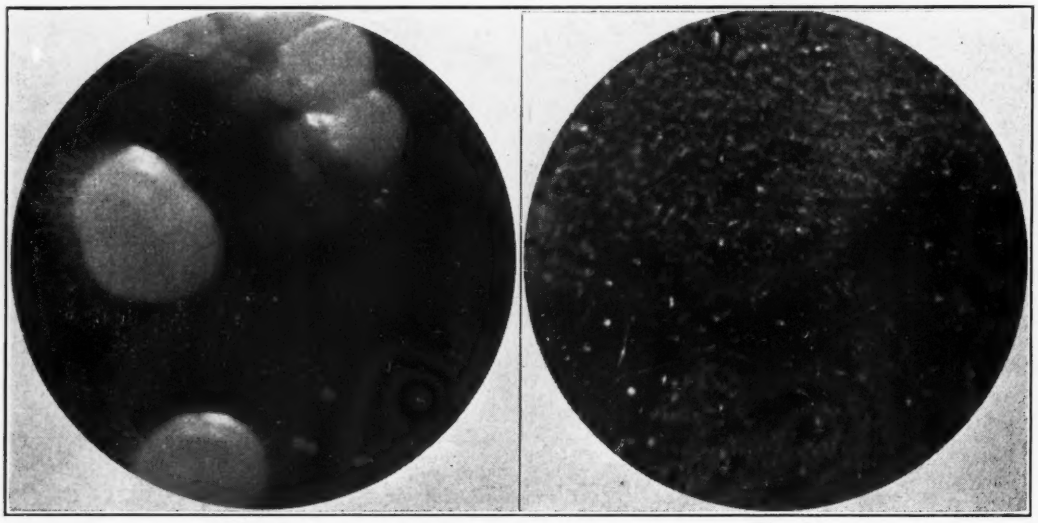

Fig. 2. Fig. 3.

Fig. 2.—Monilia colonies showing mycelium. Sabouraud's medium, ten days' incubation.
Fig. 3.—Monilia showing mycelium with attachment of clusters of yeastlike cells from corn meal agar plate. High dry objective 1/16, No. 4 ocular.

action of the saliva, the friction of the food bolus during mastication, and induce a condition of dryness of the mucous membrane, to which Henrici calls attention as favoring the growth of these organisms.

CLINICAL CASES

Mr. B. had been wearing a partial vulcanite denture for several months. He visited the office complaining of a burning sensation beneath the appliance. Removal of the denture showed the mucous membrane to be red, inflamed, and covered by several small white patches. The inflamed area extended to the periphery of the denture (Fig. 4). Smears and cultures revealed the presence of *Monilia albicans*. Both the area of the palate and the palatal surface of the denture were swabbed with 5 per cent aqueous gentian violet. No trimming or grinding was performed on the denture. The patient was advised to keep the denture in a mild hypochlorite solution at night. After three applications

of gentian violet at forty-eight-hour intervals, the mucous membrane again appeared normal. The patient stated that outside of attacks of indigestion he was in good general health. I have seen this patient several times within the last six months and have noted no recurrences. A culture taken from the area several months after the attack revealed no monilia.

Mrs. B., the above patient's wife, was also wearing a partial upper denture and came to the office about a month after the husband's first visit. I was astounded to note that she also had an area beneath her denture similar to that described above. (Fig. 5.) Under the same treatment in a week, the mucous membrane was restored to normal. *Monilia albicans* was also found in cultures from the inflamed area. Several cultures, taken two weeks after the mucous membrane was again normal, contained no monilia. I believe that the husband was the source of his wife's infection.

Several other cases have been encountered in individuals who were suffering from some systemic disturbance such as diabetes or gout.

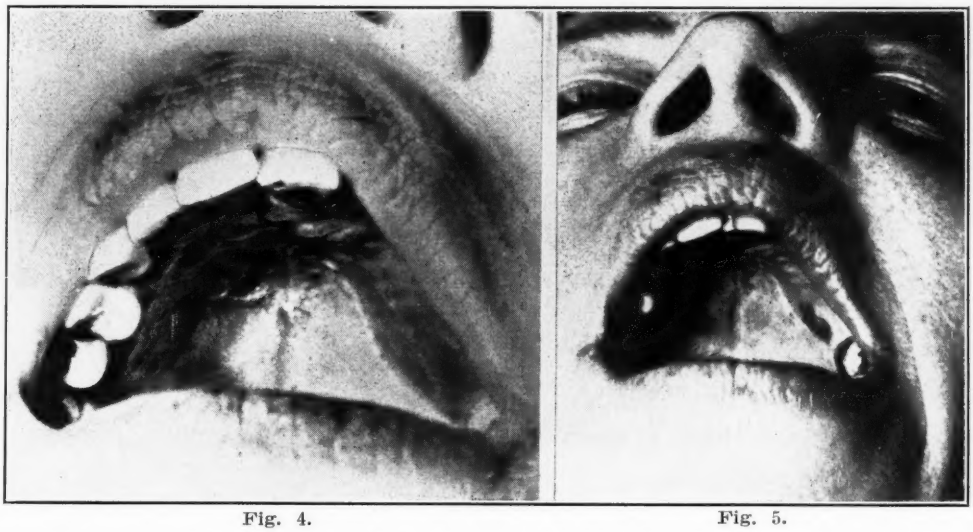

Fig. 4. Fig. 5.

Fig. 4.—Mucous membrane intense red, several small white patches present. Red area in size equal to imprint of denture.

Fig. 5.—After two applications of gentian violet, mucous membrane practically normal except for one area. This became normal within forty-eight to seventy-two hours with application of gentian violet.

CONCLUSIONS

It is important to emphasize at this time that not all cases of denture sore mouth are due to infection by yeastlike organisms. This condition is more often the result of faulty fitting dentures, improper bite, or the idiosyncrasies of patients toward the materials contained in the dentures.

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NECROSIS OF THE MANDIBLE ASSOCIATED WITH RADIATION THERAPY

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THESE two cases are reported to show:

1. The effect at times on bone, following radium and x-ray radiation used in the treatment of malignancies of the oral cavity.

2. The necessity of oral prophylaxis prior to radiation therapy.

3. The importance of a careful examination and history prior to any surgical interference.

4. The result of surgical interference in an irradiated area.

Primary cancer of the oral cavity is invariably associated with chronic irritation. In almost all cases of malignancies in the oral cavity the mouth is in a badly neglected state. We find loose teeth, badly broken down teeth with jagged and sharp edges, roots and poorly fitting dentures and bridges.

The action of x-ray and radium radiation has an effect not only on neoplastic tissue but also on the surrounding normal tissue. The periosteum is exceedingly sensitive to radium. The surrounding normal mucous membrane is left in practically a devitalized state. Radiated bone, depending on the dosage, may become affected by osteomyelitis, while chronic infection in the oral cavity will, at this stage, flare up and result in osteomyelitis and necrosis with possibly irreparable injury.

Surgery in the oral cavity where the jaws have recently been irradiated is contraindicated. No matter how trivial this interference may seem, the removal of a very loose tooth will result in the breaking down of tissue from the loss of its recuperative powers. Infections, therefore, should be treated symptomatically. Loose teeth should be permitted to exfoliate to the point where they can be picked out with a thumb forceps. Today radiotherapists, prior to any treatment, refer the patient to the dentist for thorough hygiene and removal of infected teeth. Dr. Ira Kaplan in his book on *Practical Radiation Therapy* states: "Therefore, in mouth cases, proper dental care must be given the patient before radiation is attempted, as neglect to take this precaution may be the cause of bad sequelae with bone necrosis, and sometimes even bring about a fatal outcome."

To prevent any subsequent sequelae, Dr. Maurice Lenz and Dr. J. Robert Fried, radiotherapists at Montefiore Hospital, go one step further. Prior to any radiation therapy the patient is referred to the dental department not only for

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the removal of all nonvital and infected teeth, but also for the removal of teeth which might become infected in the next three years.

Case 1 illustrates points one and two. Patient, I. B., male, aged seventy-two years, was admitted to Montefiore Hospital July 21, 1933. Occupation, painter; born in Austria.

Chief Complaint: Pain and swelling in floor of the mouth and profuse discharge.

Previous History: About one year before, the patient's son noticed a swelling on the right side of the patient's neck just underneath the mandible. It came

Fig. 1.—Case 1. Lateral plate. X-ray shows beginning of necrosis in mandibular right premolar and molar region.

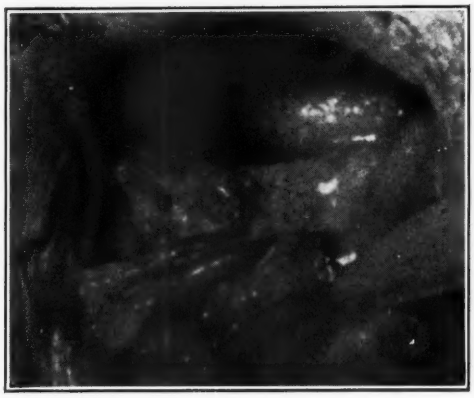

Fig. 2.—Case 1. Photograph showing necrosis of right mandible with mandibular right canine and first premolar teeth exfoliating.

on very slowly and was not painful. A physician performed an operation and removed some "swollen glands." There was no further trouble, and the patient had no symptoms whatsoever for about four months. In October, 1932, he noticed a painful blister on the lower gum to the right of the midline. His dentist told him it was not due to the plates he was wearing. He went to a physician, who sent him to Memorial Hospital. At about this time, December, 1932, he noticed that a hard mass was slowly growing in the floor of his mouth.

History from Memorial Hospital: December, 1932. Diagnosis: (1) Cancer of the floor of the mouth. (2) Basal cell carcinoma of the skin of the face.

Pathologic Report: Jan. 4, 1933, floor of the mouth—squamous cell carcinoma, Grade 2 R. R. Biopsy from craterlike lesion of left nose—basal cell carcinoma.

X-Ray Treatment: Jan. 6 to 10, four 500 R units divided between right and left neck. Jan. 2, 1,000 mchr. to left side of nose.

Follow Up: Feb. 17, 1933, swelling in submental region was greatly increasing. There were two small sinuses from which purulent material from the submental region was draining into the defect in the floor of the mouth.

Patient received symptomatic treatment until July 1, 1933, when he had a severe hemorrhage from the mouth. He was taken to Morrisania Hospital, kept

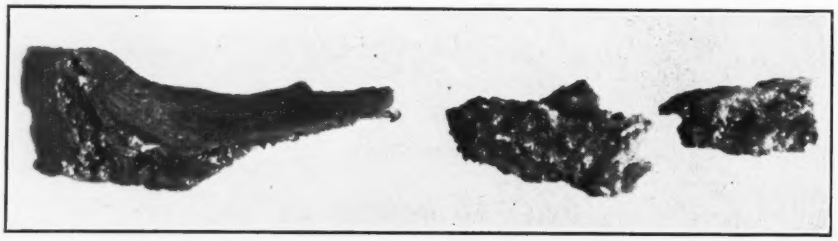

Fig. 3.—Case 1. Photograph showing the removed sequestra.

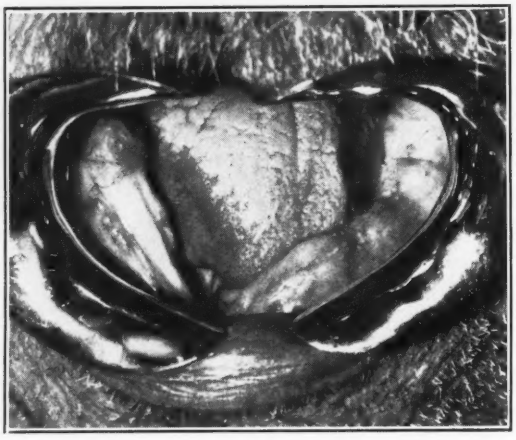

Fig. 4.—Case 1. Photograph showing regeneration of mandible.

there five days under observation and then discharged with no recurrence. On July 15 he noticed that the right lower jaw became very swollen. He was treated with compresses by a physician, and the swelling gradually went down. However, at admission to Montefiore Hospital patient said it was not quite back to normal.

Childhood Diseases: Not recalled. Influenza in 1918. Double cataract operation in 1930. Glands removed in 1932. Habits normal. Occupation, painter since 1900; mine worker before that. Examination July 28, 1933, loss of weight about twenty pounds during past year. Gastrointestinal examination negative; appetite fair; no nausea; genitourinary examination normal. Nose enlarged, slightly nodular and telangiectatic, healed circular scar in left side of nose, no obstruction, no discharge. Oral Cavity: Craterlike formation in

floor of mouth from right frenum of tongue to right second premolar region. Mucous membrane on lingual surface of mandible denuded from canine to first molar region. Cavity in floor showed foul-smelling greenish purulent material. Remaining teeth present: Right mandibular canine; first and second premolars and first molar were very loose; exudation of pus from gingival margins. Mucous membrane in mandibular anterior region was inflamed, soft and spongy. There were several sinus openings from which pus exuded freely.

Radiographic Examination: Lateral plate right side shows area of destruction of bone from canine to molar region. (Fig. 1.)

Impression: Cancer of floor of mouth—possible metastasis to jaw or more likely osteomyelitis of mandible.

On Oct. 24, extracted mandibular right second premolar which hung loosely in the jaw. Removed sharp irritating edge of sequestrated bone. Previously had removed mandibular right first premolar and canine which hung loosely in a horizontal position in the necrotic bone. (Fig. 2.)

November 3, large portion of necrotic bone was removed from the anterior region of the mandible to increase the patient's comfort.

Fig. 5.—Case 2. X-ray pictures of patient's teeth, prior to x-ray therapy.

November 10, remaining sequestrum was removed. At present there is loss of mandible from right third molar region to left canine region. (Fig. 3).

Pathologist's Report: (By Doctor David Perla.) Nov. 28, 1933, section showed extensive areas of necrosis within medullary portion of the bone. No formed elements present.

Diagnosis: June 10, 1934, bone sequestrum and necrotic tissue. Evidence of regeneration with hiatus present in mandibular right canine region; the mucous membrane was normal. (Fig. 4.)

February, 1935, patient died of bronchopneumonia.

Case 2 illustrates points two, three and four. Patient, C. S., male, aged sixty-nine years; occupation, clerk. Patient was admitted to Montefiore Hospital, February, 1930.

Chief Complaint: Pain and interference with swallowing.

Previous History: Patient was admitted to Montefiore Hospital complaining of difficulty in swallowing and pain in left cheek for past two months.

Feb. 8, radiograms of mandible brought to the hospital by patient revealed presence of the following teeth: $\overline{8\ 4\ 2\ 1}\,|\,1\ 2\ 3\ 4\ 5\ \overline{8}$. A cystic area 1 cm. in diameter was present at left first bicuspid root. (Fig. 5.)

Fig. 6. Fig 7. Fig. 8.

Fig. 6.—Case 2. Lateral x-ray plate showing beginning of necrosis of mandible on left side.
Fig. 7.—Case 2. Lateral x-ray plate showing marked necrosis of mandible on left side, fifteen months later.
Fig. 8.—Case 2. Lateral x-ray plate of left mandible showing pathologic fracture.

Biopsies taken from ulceration of the left cheek at the junction of cheek and gingival sulcus near the posterior third of the upper jaw, and from a cauliflower mass covering the left posterior third of the tongue, showed a squamous cell carcinoma, with full differentiation in cheek, and slightly less differentiation in the tongue.

Patient was given extensive x-ray therapy from March until April, 1930. A severe reaction followed with a complete shedding of the epidermis of the skin and mucous membrane of the mouth. Recovering from the reaction, the patient remained relatively well with exception of dryness of the mouth and a small ulcer about 1 mm. in diameter on the medial surface of the left mandible, about ½ inch anterior to the angle of the jaw. The ulceration gradually increased in size to about 6 mm. in width. There was a healed depression in the left side of the tongue where the cauliflower mass was present.

Nov. 9, 1931, patient returned to Montefiore Hospital with a distinct area of necrosis in the left mandibular cuspid and bicuspid region. (Fig. 6.) The patient complained he had a toothache and went to his dentist who radiographed the part and, without further questioning the patient, removed left first bicuspid root with cystic area and left second bicuspid tooth.

Feb. 24, 1933, patient returned to Montefiore Hospital complaining of constant, terrific pain and trismus of jaw. Left lateral x-ray plate showed marked area of necrosis in bicuspid and molar region. (Fig. 7.)

May 23, pain in left mandible increased. Patient received an alcohol injection of the mandibular nerve at Presbyterian Hospital with no resultant relief.

Oct. 13, patient returned to Montefiore Hospital Dental Department. Examination revealed necrosis of left mandible extending from first bicuspid to angle of jaw. A pathologic fracture was discovered with marked displacement of posterior segment. (Fig. 8.) Bone was denuded of mucous membrane. The edges of the exposed bone were irritating to the patient's tongue and cheek. Upon recommendation of the Radiotherapy Department, these edges of bone were removed. Patient later visited Presbyterian Hospital where more of the sharp edges of the necrotic bone were removed. Sequestrum not sufficiently loose to be taken out readily.

Sept. 12, 1934, patient returned to Montefiore Hospital. Examination showed anterior third of left mandible to be intact and middle third absent. Anterior third was very tender to pressure. Patient was advised to have the anterior portion of left mandible excised. Patient temporarily refused any surgery.

Nov. 29, 1934, patient died of bronchopneumonia. No postmortem.

DISCUSSION

Case 1 particularly illustrates the necessity of oral prophylaxis prior to radiation therapy. The x-ray dosage given in this case is not considered excessive. Although the Dental Department at Montefiore Hospital has no radiographic record of this patient's few remaining teeth prior to irradiation, it is reasonable to suppose they could not have been in perfect condition at the age

of seventy-two years. We believe that the bone might have been more resistant to deep x-ray treatment without the presence of these teeth. In Case 2, as in Case 1, it would have been a safer procedure to have rendered this patient edentulous prior to any x-ray therapy. Case 2 also illustrates the importance of a careful examination and history of the patient. Had an examination been made by the dentist he would have seen the depression of the tongue and the denudation of the mucous membrane from the lingual surface of the mandible. Questioning the patient would reveal that he received x-ray treatment. This case, also, distinctly shows the result of trauma on tissue in an irradiated area.

Department of Orthodontic Abstracts and Reviews

Edited by
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The Use of Dentin Débris as a Root Canal Filling (Die Wurzelfullung auf Grund der reparativen Fahigkeit der Wurzelhaut). By L. Göllmer, Ztschr. f. Stomatol. **34**: 761, 1936.

The purpose of a root canal filling is to replace the tissue loss occasioned through the removal of the pulp. In analogy to the repair of other tissue, the laws of replantation of human tissue should be observed, and these laws

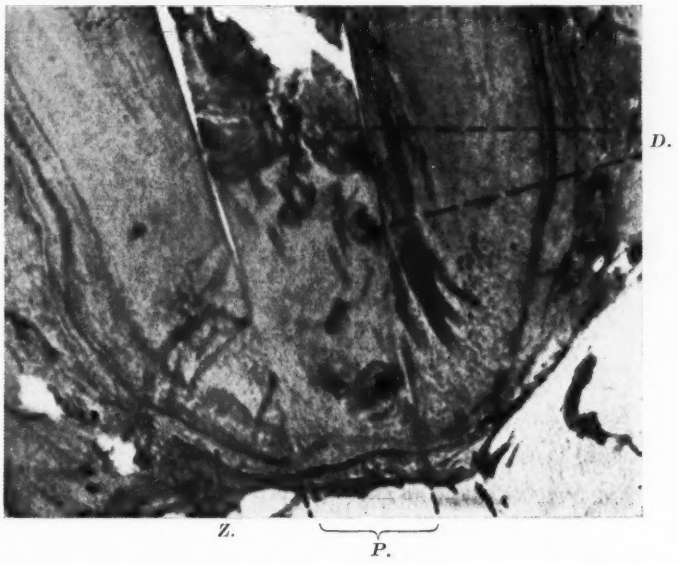

Fig. 1.—*P*, Place of original apical foramen, closed in with dental tissues. *Z*, newly formed cementum layers, covering the original foramen. *D*, dentin débris in pulp canal, united with cementum.

ordain that the material for repair should be taken from the tissues of the tooth itself. Therefore, the canal should be filled with its own dentin. The dentin exerts a stimulating influence upon cementum formation. Whenever free dentin surfaces are present, as occurs in tooth fractures, they are being covered by cementum. The same will happen if the dental foramen is closed with dentin.

The technic of the root canal filling is as follows: (1) anesthesia through novocaine; (2) removal of crown portion of pulp; (3) preparation of the canal with a special drill; (4) filling of root end with dentin fragments; (5) removal of pulp rests and filling of canal with cementum.

The special drill used in the preparation of the canal has two objectives: first, when the engine revolves to the right, it opens the way to the foramen and slightly widens the canal; second, when the engine runs in reverse, toward the left, it cuts dentin splinters from the lining of the canal, and at the same time presses them toward the foramen. By changing the engine run several times from right to left the canal is finally densely filled with dentin débris.

Experiments on the teeth of dogs demonstrate that, in most instances, the dentin fragments are united with cementum (Fig. 1*D*). Newly formed cementum layers cover that part of the root where originally the apical foramen was present (Fig. 1*Z*).

The statistics of human teeth treated according to the described method show the following results.

Group I (older method). Total 33 teeth, reexamination after 4-5 years. Without noticeable change, 25 teeth; failure 25 per cent.

Group II (improved method). Total 170 teeth, time of reexamination 1-4 years. Without noticeable change 146 teeth; failures 14 per cent.

Group III (latest method). Total 28 teeth, time of reexamination 8-12 months. No changes noticeable on any teeth.

E. N.

The True Center of the Jaws (Die wahre Mitte der Kiefer in der kieferorthopädischen Zustandsbestimmung). By A. Martin Schwarz, Ztschr. f. Stomatol. **34**: 257, 1936.

The mesial contact point of the maxillary central incisors is not always the true center of the upper jaw because these teeth may be malposed. The malposition may even involve the jaw bone, thereby changing the position of the incisive papilla and the places of attachment of the lip and tongue. Even the beginning of palatal raphe may be deviated.

The true center is indicated only by that part of the palatal raphe which lies between the second right and the left transversal ridges; these ridges run from the center of the palate to the region of the first premolar. The place where the second ridges join lies beyond the region of the incisive bone. Furthermore, the bone there is still so heavy that it is not influenced by the common divergencies present in the nasal cavity, while the portion of the palatal bone extending further posteriorly is thin and influenced by such deviations.

The posterior center of the palate is the farthest posterior point of the raphe in the region of the choanae, which most times are symmetrically formed. Through these two points the true center line of the palate is determined.

The true center of the lower jaw is, in its anterior portion, given by the symphysis of the two portions of the mandible. In this place, there exists on the inside of the mandible the mental spine, a prominence where the muscles genioglossus and geniohyoideus insert. The location of the mental spine can

be determined by an x-ray picture taken from below the jaw. Such a picture sometimes also shows the rests of the symphysis of the right and left part of the mandible (which coalesce during the first year). On the outside of the

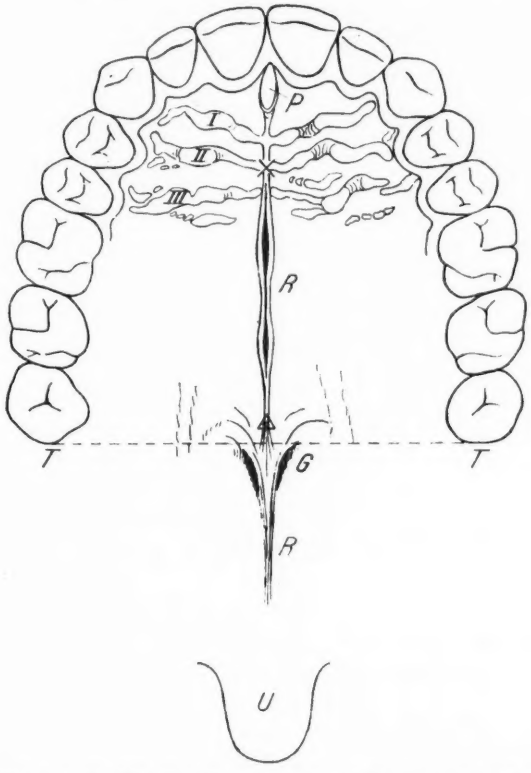

Fig. 1.—*P*, Incisal papilla. *I, II, III*, the three groups of transverse ridges. *R*, Palatine raphe. *G*, Transition to soft palate. *U*, Uvula. At x, anterior, at △ posterior, true center of palate.

mandible there is also a center prominence and two lateral tubercula (which may be palpated) indicating the center of the jaw, independent from the position of the anterior teeth.

The location of the true center of the jaws is important in diagnosing malpositions complicated by the shifting of the anterior teeth to one side.

E. N.

In Memoriam

Elizabeth Ellen Richardson
1863—1936

Dr. Richardson died at her home in Redwood City, California, November 30, 1936, after a brief two-day illness, in her seventy-third year.

She was born June 11, 1863, at Rio Vista, California, and received her education in the local schools there, graduating from St. Gertrude's Convent High School, and later studied music in Sacramento, California. In 1888 she was married to Captain John Richardson, port captain of the Western Pacific Railroad, who died six years ago.

Dr. Richardson was constantly striving to improve herself and conditions about her; and, becoming interested in a career in 1897, she entered the Dental School of the College of Physicians and Surgeons of San Francisco, from which she was graduated in 1901.

Following graduation, she engaged in general practice in San Francisco until the earthquake and fire of 1906—after which she removed her offices to Berkeley, California. In 1915 in response to an urge to specialize in children's work, Dr. Richardson entered and was graduated from the Dewey School of Orthodontia in Kansas City, Missouri. Returning from Kansas City to Berkeley, she limited her practice to orthodontia and became associated with her Alma Mater in a teaching capacity in that subject. Later she moved her office to the Butler Building, San Francisco, continuing the specialty of orthodontia and her connection with the College of Physicians and Surgeons as Professor of Orthodontia. Dr. Richardson held this teaching position for the past twenty-one years, to the time of her death.

The College, the dental profession, and her many friends have lost a loyal, faithful supporter. Her loyalty and faithfulness were most outstanding—she was always present at lectures, clinics, dental society and faculty meetings.

Dr. Richardson enjoyed a good practice; and, though thirty-seven years of age when she was graduated from dental college, she attained a success few attain and won a national reputation of high esteem. She always maintained an interest in education and personal study. In 1931 Dr. Richardson received an A.B. degree from the San Francisco College for Women, and at the time of her death was working for a master's degree.

The offices Dr. Richardson held were many, as were the dental organizations of which she was a member. She was a life member of the San Francisco District Dental Society and the California State Dental Association; a member of the American Dental Association, the American Society of Orthodontists, the Association of American Women Dentists—and a past-president of the San Francisco Bay Unit of that organization; a charter member of Delta Delta

Chapter of the Omicron Kappa Upsilon National Honor Society; a member of Tau Kappa Omega, honor society of her Alma Mater; and a member of and treasurer of the Women's Auxiliary of the College of Physicians and Surgeons.

With all her success, Dr. Richardson was a good, generous citizen and ever ready to help many worthy people and causes—her purse was always open—a worthy cause was never refused. Her home was always open to friends—her garden at Redwood City was a joy to fruit and flower lovers—her faithfulness to duty, her encouragement freely given to young people, were all a great source of inspiration. Dr. Richardson's death brings all this to an end; though the good she has done will live on in the hearts and minds of those who knew her. In order that her memory may be carried on down through the years every member of the San Francisco Bay Unit, Association of American Women Dentists, faculty members of the College and friends have contributed to the Memorial Scholarship Fund of the College of Physicians and Surgeons a sum to help worthy students in need to complete their education.

News and Notes

American Society of Orthodontists

The thirty-fifth annual meeting of the American Society of Orthodontists will be held at the Edgewater Beach Hotel, Chicago, April 19-22, 1937.

PAUL G. SPENCER, President
1817 Austin Avenue
Waco, Texas

CLAUDE R. WOOD, Secretary
608 Medical Arts Bldg.
Knoxville, Tenn.

American Board of Orthodontia

A meeting of the American Board of Orthodontia will be held at the Edgewater Beach Hotel, Chicago, April 17, 1937. Orthodontists who desire to qualify for certificates from the Board should secure the necessary application blank from the secretary. The application must be returned to the secretary, together with any other required credentials, at least sixty days prior to the date of examination. Applications filed at the time of the Board meeting will have preliminary consideration, so that the applicant may be advised of the work required for his subsequent examination. Attention is called to the following resolutions adopted by the Board:

Any person desiring to make application to the Board for a certificate must have been in the exclusive practice of orthodontia for a period of not less than five years or an equivalent to be determined by the Board and based upon the following conditions:

1. He must be an instructor in orthodontia in a school satisfactory to the Board.

2. He must be an associate in the office of an orthodontist whose standing is satisfactory to the Board.

3. It is definitely to be understood that any person at the time of making application for a certificate shall be in the exclusive practice of orthodontia in his own name.

CHARLES R. BAKER, Secretary,
636 Church Street,
Evanston, Ill.

Eastern Association of Graduates of the Angle School of Orthodontia

The next meeting of the Eastern Association of Graduates of the Angle School of Orthodontia will be held March 15 and 16 in the Anatomical Laboratory of Western Reserve University, Cleveland. Arrangements for the program are in the hands of Dr. T. Wingate Todd and the staff of the Brush, Bolton and Associated Foundations.

E. SANTLEY BUTLER, Secretary,
55 Locust Avenue,
New Rochelle, N. Y.

North Atlantic Orthodontic Society

The fifth semiannual meeting of the North Atlantic Orthodontic Society was held at the Hotel Pennsylvania, New York City, on December 16, 1936.

Pacific Coast Society of Orthodontists

The Pacific Coast Society of Orthodontists will hold its next meeting February 22-24 at the Palace Hotel, San Francisco.

Members of the profession who are in the exclusive practice of orthodontia are cordially invited to attend.

DR. EARL F. LUSSIER, Secretary
450 Sutter Street
San Francisco, Calif.

CENTRAL SECTION

The Central Section of the Pacific Coast Society of Orthodontists met September 15, 1936, at the Plaza Hotel, San Francisco, for the regular meeting. Dr. W. W. Leslie opened the meeting with an interesting half-hour of colored moving pictures taken by himself on his recent trip to Bryce, Zion and Grand Canyons. Dr. Fontaine, the guest speaker, presented a paper, "Interrupted Dentition, Its Etiology and Treatment." He accompanied his paper with slides and showed conclusively the malconditions resulting from such cases. Considerable discussion followed, of interest to all. Dr. Sweet showed a few models of impacted cuspids before and after treatment, with x-ray pictures of each. He discussed the method of treatment used in each case and stressed the simplicity and importance of performing the operation. He likewise showed a type of lock of his own design for use on lingual arches.

SOUTHERN SECTION

The Southern Section of the Pacific Coast Society of Orthodontists held its regular meeting on September 11, 1936, at the University Club, Los Angeles. Dr. Ben Reese commented on the recent article by Dr. David W. McLean, "Orthodontia for General Practitioners," which had appeared in the September, 1936, issue of the *Journal of the Southern California State Dental Association*. Dr. C. M. McCauley offered the hospitality of his ranch for the next meeting of the Southern Section. Drs. Bedford, Muchnic, and Nance presented illustrated, informal papers on the subject "Treatment of Troublesome and Recalcitrant Cases." The cases presented were of unusual interest in that they taxed to the utmost the resourcefulness and judgment of the operators. It was the opinion of the group that these men had, with acumen, extricated themselves from very puzzling predicaments. Dr. Nance also presented, upon a living subject, a most effective and all-encompassing method of post-treatment retention.

Death of Dr. Arthur Andrew Somerville

Dr. Arthur Andrew Somerville of Toronto, Ontario, died on November 24, 1936. He was born in Orono, Ontario, September 23, 1903, and was graduated from Toronto University in 1930.

European Orthodontological Society

The next meeting of the European Orthodontological Society will be held in Brussels on May 17 and 18, 1937, under the presidency of Dr. Lucien De Coster. The Headquarters will be at the Palace Hotel. The scientific meetings will be held in the new Eastman Clinic buildings, by courtesy of Dr. Watry.

Communications from those who desire to contribute to the program may be addressed to

G. F. CALE-MATTHEWS, Hon. Secretary
95, Newhall Street
Birmingham, 3, England

Dallas Midwinter Dental Clinic

The tenth Midwinter Dental Clinic of the Dallas County Dental Society will be held at the Adolphus Hotel in Dallas on February 1, 2, and 3.

The instructors will be: Dr. M. G. Swenson of New York University College of Dentistry, on "Full Denture Procedure"; Dr. W. H. Hagen of Seattle, on "Operative Dentistry and Practical Application of Porcelain Technic"; Dr. Robert L. Dement of Atlanta, on "Periodontoclasia"; and Dr. Glenn J. Pell of Indianapolis, on "Oral Surgery."

For additional information, address Dr. T. A. Lipscomb, Secretary, 1614 Medical Arts Bldg., Dallas.

Notes of Interest

Dr. Burton A. Hoffman announces the removal of his office to Medical Centre Building, 333 Linwood Avenue, Buffalo, N. Y. Practice limited to orthodontia.

Dr. Earl C. Bean announces that beginning January 1, 1937, his practice is limited to orthodontics. He is now associated with Dr. George H. Herbert and Dr. Leo B. Lundergan, 4767 Westminster Place and 7002 Pershing, St. Louis, Mo.

Dr. W. J. Fitzpatrick and Dr. H. W. Cook have opened a branch office at 541 Lincoln Road, Miami Beach, Fla. Orthodontia exclusively.